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RELIGION AND NATURAL SCIENCE

RELIGION AND NATURAL SCIENCE

BY

E. HAIGH, M.A., B.Sc.

"My thoughts are not your thoughts, neither are your ways my ways, saith the Lord.

"For as the heavens are higher than the earth, so are my ways higher than your ways, and my thoughts than your thoughts."

ISA. lv. 8, 9.

Isa 55: 8-9

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TO

MY PUPILS,

WHO ALSO HAVE BEEN MY TEACHERS

PREFACE

THIS book is intended as an introduction—nothing more—to a very wide field of thought and literature. It is primarily addressed to students of Natural Science by one who has been engaged in the work of secondary education for more than forty years, and principally, during that period, as a teacher of physical science.

At the present time the earnest-minded student who wishes to know something of the relations of modern science to "questions of the day," and more especially to religious and philosophic thought, is likely to be bewildered by the number and variety of excellent works in which such subjects are discussed with fullness and ability by writers of eminence. But, from his point of view, such works demand for their perusal an amount of time and severe mental effort which he can ill afford to give at a time when he is preparing for difficult professional examinations. Consequently such study is likely to be postponed indefinitely, if undertaken at all.

It is for this class of readers that the author has ventured to write this book. Within so small a compass, quite apart from the limitations of

the writer, it is manifestly impossible to deal adequately with any of the great topics touched upon in these pages. Nevertheless, an endeavour has been made to indicate clearly the nature of some of the principal problems which arise in the course of such investigations, and of the present trend of thought in relation to them. To marshal the evidence in such a form that the reader may see how the land lies in reference to these matters, and thus more easily pursue any further investigation for himself, has been the objective steadily kept in view. In pursuance of this aim, frequent reference has been made to works of the higher class above mentioned, to the later study of which this outline sketch may serve as a guide. At least, it is hoped that the reader will acquire a sense of location which will enable him to recognize more clearly what part of the field he is exploring when he undertakes a detailed study of any of the subjects here so briefly reviewed.

Originally intended only for private circulation, the publication of these notes in book form is mainly due to the encouragement given to me by two official members of the Student Christian Movement—the Rev. Hugh Martin, M.A., and the Rev. F. A. Cockin, M.A., to both of whom I am indebted for helpful suggestions and useful criticism of the typescript copy. My best thanks are due to a former colleague, the Rev. E. Arblaster, M.A., for valued assistance in a final revision of the text, and also to the Rev. L. W. Grensted, B.D., for kindly reading through

the chapter dealing with the New Psychology (Chapter VI.). It is scarcely necessary to add that responsibility for any personal opinions expressed in these pages rests solely with the writer.

E. H.

194 Divinity Road,
Oxford.

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CHAPTER I

MAINLY ABOUT DEFINITIONS

Das Denken ist auch Gottesdienst.—Baron von Hügel.

Many years ago an old and rather eccentric Oxford don, meeting the son of a friend in the High Street of that city, surprised the young man by impulsively taking hold of the lapel of his coat and saying impressively: "Tell your father, from me, that one of the great evils of our time is *the worship of detached ideas*. Good-morning." This form of idolatry is by no means confined to any one age or to any one race, as is witnessed by the slogans of parties and the catchwords which are used to appeal to the passions of a crowd. With regard to social, political, and religious questions there are to-day, in this respect, "gods many and lords many." A detached idea tends to acquire an influence in excess of its value, and so to fill the mental field of view that some complementary truth is forced into the background. It is a hemisphere of truth, a moon rather than a sun in the intellectual firmament, always turning the same face to its devotees. The mind focussed upon it loses the sense of true proportion. This is evident in the

lives and influence of many great leaders of thought. The error which is most pernicious is not usually the lie pure and simple, which can easily be recognized at its proper value, but the half-truth detached from its counterpart. "Camouflaged error"—*i.e.*, error into which a large admixture of truth enters—is error in its most insidious form, and that which is most difficult to refute.

Though every age is necessarily an age of transition, yet some periods of history are more distinctively marked than others by the influx of new ideas, and in such a period we are now living. It has been well said that truth discovered in one generation is generally assimilated, not by that generation, but by the men of a later age. The more novel the idea, the wider its scope and the greater its significance, the longer is the time which must elapse before it meets with general acceptance. To estimate the value of new views, and to co-ordinate them with the underlying but obscured truth which the past outlook usually possesses, is a problem with which all thoughtful men have to deal.

Reception and Co-ordination of Ideas.

The task of severe thought is very uncongenial to most people even if they have at command the requisite leisure for its performance. They prefer to delegate such labour to others. Persons of this class regard new ideas as alien intruders, disturb-

ing to one's peace of mind, and therefore to be deported as soon as possible. They prefer to live at a low intellectual level and choose many ways of "killing time," thus filling up vacant hours by occupations which leave no room for serious thought. By another class, less averse to thinking, ideas are admitted into the mind almost indiscriminately; little importance is attached to them, and their possessors are nothing loth to see their places taken by others. The speaker last heard, or the book last read, has supplied a set of opinions which may be displaced as readily as it has been acquired. This makes of the mind a sort of casual ward whose inmates, apart from a few permanent officials, are "here to-day and gone to-morrow." Ideas thus dealt with form a mob of changing constituents rather than an orderly regiment equipped for service. People of this class often claim breadth of mind, but have no title to depth of thought.

In marked contrast to the two classes just mentioned stands a third, consisting of men who are deeply impressed with the importance of holding right views about things that matter. They carefully select those ideas which they consider of highest value and arrange them in a formal system. The effort is praiseworthy, and the result often very valuable, but to affix the word FINIS to it is at least risky. Having once made this selection and adjustment of their views, they regard adherence to them as an imperative duty, and consequently their attitude towards new

ideas is distrustful and defensive rather than discriminatory and acquisitive. Fixity of language does not ensure fixity of thought.[1] To preserve a truth it is sometimes necessary to recast the form of its expression; otherwise what was built for a fortress may ultimately become a prison-house. The obvious danger of this ultra-conservative attitude is that it usually fosters a spirit of intolerance of any opposition, and retards that individual growth which is essential to healthy development.[2] Nevertheless, this class includes many learned men who have left their mark upon history, although their influence has often outlasted the usefulness of some of the views upon which they laid great stress.

[1] The variability in the meaning of language cannot be overlooked. The philosophic terms "subjective" and "objective" have quite interchanged meanings during the last two centuries. This is, of course, an extreme instance of fluctuation in the meaning of words. (See *Murray's Oxford Dictionary*.)

A very instructive note on the relation of language to experience will be found in *Religion and Natural Law*, by C. F. Russell, M.A. (p. 90).

[2] This representation is not overdrawn. In *Early Reminiscences*, by S. Baring-Gould, the author thus writes (p. 340): "With my ordination I close the first chapter of my life. In that period described before I was ordained, I had formed my opinions, and I have never since altered them to the right hand or to the left." It is scarcely likely that the writer of this statement does full justice to himself. But it throws light upon the offensive harshness with which, in one of his works, this gifted author criticizes religious views not in harmony with his own convictions.

A more helpful class—"a minute fraction of the cultivated world"—consists of men who neither admit new views indiscriminately nor reject them summarily, but carefully and impartially examine their nature and value.

We have to be on our guard lest the natural craving for finality takes a morbid form. There is a tendency to construct an artificial boundary which is not the true goal, but is constantly in need of removal and reconstruction. There are many people who, having achieved a certain position, want to stay where they are. They recognize a real value in what has been attained and are disposed to say, "Let us make here . . . tabernacles." To realize that such resting-places must be but temporary and only occupied as a stage on the road to further effort is to them disheartening.

The Difficulty of Exact Definition.

One hindrance in the search for truth which the reader must be prepared to meet is the difficulty of exact definition. No matter what may be the subject under consideration—science, philosophy, or theology—this problem is perpetually recurring. Some years ago a distinguished American writer asserted, almost in the words of Plato, that nine-tenths of all controversy resolved itself into logomachy—strife about the exact meaning of words. The inadequacy of ordinary language to express the finer shades of thought is con-

tinually forced upon our attention. Hence those writers are most instructive who endeavour to make clear to the reader the fundamental assumptions which they adopt and the mental content of the most important terms which they employ. A student may take up a book on a difficult subject written by a competent authority, and afterwards, with a view to extend his knowledge, he may read a second book on the same subject by an authority equally eminent. What he has learned from the first writer he will not improbably find controverted, in some important particulars, by the second. This is very perplexing, especially to the reader in search of reliable information, who may be not unnaturally inclined to ask : "Where shall wisdom be found?" The disagreement may be real—a direct conflict of opinion ; but also the divergence may be more apparent than real, and to some extent explained by the fact that one author may give to an important term a different or a wider meaning than the other. Frequent examples of this kind will be found.

Classification of Ideas.

Just as in ordinary life we find it convenient to adopt the principle of the division of labour, since the welfare of the community is thereby promoted, so in the region of mental activity it is convenient to partition off certain domains of thought, grouping together those ideas which

are most closely related to each other. To these divisions we give such titles as Art, History, Natural Science, Philosophy, and Religion ; these great classes having also many subdivisions. This procedure makes for efficiency in study and investigation, but the ever-recurring difficulty of exact delimitation meets us here. A subject cannot be said to be fully known until its relationship to other subjects has been accurately determined. Before we can draw correctly the boundary line of a country we must have explored it to its farthest limit in every direction. Such complete knowledge is not possible to Science but only to Omniscience.

New ideas, whatever may be the subject to which they stand related, frequently require a new terminology for their expression. The mint of the mind is compelled to continue the coinage of new words to keep pace with the progress of thought and discovery. Sometimes the boundaries of our partitions become so indistinct that it is found convenient to abolish them and to substitute a new term for the enlarged field. Thus Botany and Zoology are words still in common use to distinguish the vegetable and animal kingdoms from each other, but the difficulty of drawing any strict line of demarcation between the lowest forms of plant and of animal life, and the recognition of their common characteristic of cellular growth, have led to the introduction of the term Biology to include both these provinces. On the other hand, the increase

of scientific knowledge may require the introduction of new subdivisions. Physics, Chemistry, and Biology mark off three closely connected branches of Natural Science. But, within the last fifty years, additions to the knowledge of these subjects have necessitated further differentiation. Between the first pair of this triad Physical Chemistry has been introduced to include a large number of facts related to both branches. Similarly it has been found convenient to insert Biochemistry as an intermediate branch of science between the last pair. Hence the task of delimitation is never one which can be regarded as fully accomplished.

Natural Science—Philosophy—Religion.

These terms denote three very important regions of mental and spiritual activity. How are they distinguished from each other? How are they related to each other?

Science is distinguished from what is usually called common knowledge only by the greater accuracy which is aimed at. The term may be used in reference to any subject about which exact knowledge is possible. Natural Science is a subdivision of science relating to the order of the physical universe, but the word Science, without any adjective, is often used to denote this subordinate branch. In these pages we shall be mainly concerned with this restricted meaning of the word.

NATURAL SCIENCE seeks to *know*. It observes, making use of all aids to observation that the most elaborate instruments can supply. Our sense-perceptions form the starting-point of all our scientific knowledge of the outer world. From the data thus obtained concepts or ideas are formed in the mind. The next step is comparison, the search for resemblances and differences however minute. The mind thus classifies phenomena and traces relationships or sequences. Hence, in scientific work, the faculties mainly in activity are the senses and the intellect. If, to the philosopher, the three "ultimate values" are Truth, Beauty, and Goodness, then to the scientist, as such, the greatest of these is Truth. He is not directly concerned with the beauty of the objects under observation nor with any consideration of moral values. But he is very directly concerned with Truth, inasmuch as he seeks for the most exact description of the phenomena of the physical world which it is possible for him to acquire with the means at his disposal.

PHILOSOPHY seeks to get behind the merely phenomenal. It endeavours to find out what the world really is, and to unify all the experiences of life. Its aim is thus to obtain a certain kind of knowledge—viz., a knowledge of what is *real* in what we call our knowledge. In the medieval universities "it included the three branches of natural, moral, and metaphysical knowledge, commonly called the three philosophies."

Natural philosophy is now usually termed Natural Science, and Ethics has been adopted as a synonym for moral philosophy, so that, in the usual modern sense of the word, philosophy is now used solely to denote metaphysical philosophy and is defined as "that department of knowledge or study which deals with reality, or with the most general causes and principles of things" (*Murray's Dictionary*).

RELIGION is a term of great comprehensiveness, and, in its varied aspects, it has received very many definitions. One definition of great generality is that it represents the relationship between Self and all that is not Self. A new epoch in psychical development arrives when a young child first uses the word "I" intelligently. This stage indicates the dawn of self-consciousness—the recognition of individuality or distinct existence. Henceforward the universe consists of two sharply defined provinces: SELF, as an entity, and NOT-SELF—all other beings and things. Thus, Religion has been defined as man's attitude towards the universe. To the theist, therefore, Religion ultimately becomes his relationship to God. "I believe the psychological basis for religion to be the sense of insufficiency, of need, of incompleteness. It is because we feel insufficient and incomplete that we seek for satisfaction and completeness in religion. Subjectively considered, therefore, the basis of religion is the sense of incompleteness. Objectively considered, religion is that which

comes to satisfy that craving for satisfaction and completeness in the human soul" (Hadfield). Hence Religion is very intimately connected with the emotional side of life. But it cannot be altogether indifferent to the scientific side; much less can it be indifferent to philosophy, for the consideration of reality is never absent from it.

> The hypothesis which I shall hope later (in my discussion of the psychological side of the philosophy of religion) to establish is based upon the premiss that the conservation of value *is the characteristic axiom of religion;* and that we shall find it expressed from different religious standpoints in different ways. . . . Finally, this axiom enables us to express very simply the relation between ethics and religion—viz., what is the relation between the conviction of the conservation of value and the work of discovering, producing and preserving values? (Harald Höffding, *The Philosophy of Religion,* pp. 9-10.)

The reader must bear in mind that the boundary lines of these great divisions are matters always open to question, and that discussions about them are continually arising. Natural Science may claim for itself a wider province than the philosopher would accord to it.[1] Again, the boundary line between Philosophy and Theology is some-

[1] See *Nature,* November 8th, 1924: "Science and Philosophy." This article is a review of a recent lecture by Professor Graham Kerr in which it is argued that "we must reject entirely the 'old philosophy' and replace it by the 'new philosophy—Science.'"

what difficult to determine. A few short extracts from the works of leading writers on these subjects will serve to exemplify the kind of divergence of view which at present exists, and which the student must expect to encounter.

If we were in possession of, and able to grasp, a unified view of the Universe, in which all the elements of existence and valuation were completely synthesized, the division of labour of which I have spoken would be unnecessary; we should not require to mark out frontiers between Science and Philosophy or Theology; but of such a synthesis there is not the remotest prospect in view. The secret of the Universe has revealed itself neither to the Theologian nor to the Philosopher. A man of science, as such, is not even concerned with the secret. The untrammelled freedom which must be allowed to workers in all departments of the great cultural work of humanity, to Philosophers and Theologians, to Historians, to the cultivators not only of Natural Science, but of Science of all kinds, should not, however, involve the erection of rigid, impassable barriers which shall mark off domains which hold no communication with one another. On the contrary, workers in one department will often receive the most valuable enlightenment, and most important suggestion, from quarters outside their own special line. (E. W. Hobson, *The Domain of Natural Science,* p. 501.)

Philosophy and Natural Science.

Philosophical knowledge does not differ essentially from scientific knowledge; there is no special source of wisdom which is open to philosophy

but not to science, and the results obtained by philosophy are not radically different from those obtained from science. The essential characteristic of philosophy, which makes it a study distinct from science, is *criticism*. It examines critically the principles employed in science and in daily life; it searches out any inconsistencies there may be in these principles, and it only accepts them when, as a result of critical enquiry, no reason for rejecting them has appeared. . . . Descartes' "methodical doubt," with which modern philosophy began, . . . consisted in doubting whatever seemed doubtful; in pausing, with each apparent piece of knowledge, to ask himself whether, on reflection, he could feel certain that he really knew it: this is the kind of criticism which constitutes philosophy. . . . But to reject the beliefs which do not appear open to any objections, however closely we examine them, is not reasonable and is not what philosophy advocates. (Bertrand Russell, *The Problems of Philosophy*, p. 233.)

Theology and Natural Science.

But, even though we bear in mind that Theology must differ from Natural Science in some important respects . . . we may yet be inclined to ask ourselves whether it is not misleading to call Theology by the name of Science at all. For we find Theology always employing symbols and figures of a Reality transcending our understanding rather than generalizations from experience gained by the use of the senses, such as those with which Natural Science works. And we may be disposed to think that, since Theology professes to deal with what lies beyond and behind all phenomena, it must always employ such conceptions. The use of such

figures and symbols may then seem at once to remove Theology from the class of thought which the word Science very naturally suggests to us into another which is too unlike it to be conveniently designated by the same term.

Now I do not wish by any means to minimize the difference which undoubtedly exists between Theology and Natural Science in this respect; and yet it may be contended that it is a difference of degree rather than of kind. For Natural Science has made and still continues to make use, and profitable use, of conceptions which are rather justified by their practical convenience than verified by actual direct experience by means of the senses. I am thinking of such conceptions as those of ether, of atoms, and the like. I am by no means competent to understand, far less to criticize, the theories of Relativity associated with the name of Einstein, of which we have lately heard so much; and so I do not propose to say anything about them here. But it is plain that, whatever be the eventual fate of these theories, the acceptance of them must involve the relegation of some statements often treated in the past as unquestionably true accounts of the real world to the rank of more or less convenient fictions. The figurative or symbolical element, then, which is obviously present in Theology is not completely absent in Sciences to which no one would think of refusing that name. The difference between them and Theology would thus seem to be, as I said before, one rather of degree than of kind. (C. C. J. Webb, *A Century of Anglican Theology:* "Theology as the Science of Religious Experience," p. 109.)

Human Discovery and Divine Revelation.

The question is sometimes debated whether religious truth is attained by human discovery or bestowed by Divine Revelation. Let us turn to an eminent writer for instruction on this point.

We shall need some caution to avoid making false distinctions. In common language, revelation is limited to moral truth, and discovery to physical truth; and as there is a real difference between moral and physical truth, though on any Theistic theory they agree in being the thoughts of God, we get a valid distinction of subject-matter. . . . But there is no such difference of process as there is of subject-matter. Whether old or new truth be in question, we have no reason to suppose that God will communicate them by entirely different methods; and we know that man goes to work in much the same way to find out either. But moreover, if we take our Theism seriously, revelation and discovery must be the same process viewed from different standpoints. If we speak of revelation, we say that God gives knowledge of his thoughts; but we imply that man receives it—or misses it by his own fault. If we call the process discovery, we say that man finds out what must be the thoughts of God; but we imply that God has so disposed both him and them that he is able to find them out. In either case we have the same two facts—that God has ordered things in a certain way, and that man has recognized this order in them. There may be a difference in God's way of communication, but in both cases God reveals; and a difference in the facts observed by man, but in both cases man discovers. The

Divine action is not more real in the one case, or the human in the other. Revelation or discovery is neither in God's giving nor in man's receiving, but in the two together. It is neither in God's truth without, nor in God's image within, but in the meeting of the two. It comes to pass whenever God's image within recognizes God's truth without. No matter so far about the kind of truth. Be it physical or mental, or spiritual; in all cases revelation and discovery go together. The Divine and the human are always both implied; and we can no more have the one without the other than we can have the north without the south, or a circle without a centre. (Gwatkin, *The Knowledge of God*, third edition, vol. i., pp. 155-158.)

These quotations have not been given with the express purpose of inviting the reader to puzzle himself, at this stage, with the solution of the questions raised in them. The really important point is to note that these difficulties of definition exist; that they are inherent in the nature of the subjects discussed, and are mainly due to the limitations of our faculties. The word Universe denotes "turning into one" all our knowledge of it—*i.e.*, regarding it as a whole. Our mental subdivision of it into parts, for convenience of study, constitutes a reversal of this process, and the method employed is somewhat arbitrary. We have no full understanding of the whole, as a whole, nor indeed of the whole of any separate part.

To avoid a long and tedious discussion, which would here be out of place, let us employ a

material illustration which may be helpful in enabling us to understand the intimate connection of these subjects with each other. As in all parables, details must not be unduly pressed.

Suppose we take Great Britain as a physical symbol of our *Universe—i.e.*, of all subjects of thought; then suppose that we have before us three different maps of the island. The first of these we suppose to be an ordinary geographical or political map relating mainly to the general distribution of population. It will indicate the position of cities, towns, etc.; administrative boundaries; modes of communication, such as roads, rivers, canals, and perhaps railway routes. Probably no marked indications of irregularities in the surface of the country will be shown, as these are not essential to its purpose. (This map will serve to symbolize *Sciences, of all kinds.*) Our second map is constructed to represent the physical features of Great Britain, and on it rivers, lakes, mountains, with differences of surface level indicated by contour lines, form the prominent features. (*Philosophy.*) The last of our maps we take to be a geological map. It will represent Great Britain stripped of all surface material—all towns, animals and plants, loose soil, etc., having disappeared and the solid rock being exposed. (*Religion.*)

Each of these maps relates to the same entity, but each has been constructed with a special object in view. They are, however, very closely connected. Indeed, some knowledge of another

map may be gained from the close examination of any one of them. Thus on the political map we may notice districts with few or no towns. We may reasonably infer that this part of the country is unsuitable for habitation. The physical map will supply the reason—viz., that it is a mountainous district. Again, the geological map is closely related to the other two. On the physical map you may observe a range of mountains in one part and an isolated peak in another place. This feature of the physical map is explained when you refer to the geological map, which shows you the nature of the rocks, some being of harder material than the others, or the existence of rocks of volcanic origin. Again, the geological map explains some features of the political map. Why should population be so dense in certain districts? The geological map indicates the presence of strata containing coal, ironstone, or some other mineral, on which important local industries depend. Thus, all the maps relate to the same island under different aspects, but they are very intimately related, and a full knowledge of Great Britain requires the combined contribution of all the information which each can supply.

To make our illustration more serviceable, we must suppose that all three maps are very incomplete and still in process of formation. Moreover, the knowledge required for the formation of each does not strictly advance *pari passu,* and, in their present form, the parts of each that have

been sketched are not capable of exact superposition.

If we further suppose that these maps have been constructed by different individuals, it is quite likely that disputes may arise as to what features should be included in, or omitted from, any one of them. Thus the physical geographer may use the position of towns and administrative divisions to indicate locality, though these features do not strictly belong to his subject and are not indispensable, since he might employ, for that purpose, a sufficiently developed system of lines of latitude and longitude. Again, rivers are a purely physical feature, but they serve as means of communication and are utilized as boundary lines, and for this reason the political geographer would claim the right to insert them. It might further be argued that, by using a map of sufficient dimensions and employing a suitable selection of symbols and colours, all this information could be represented on a single map.

A Penumbral Region of Thought. Suspense of Judgment.

With regard to a specific statement the remark is often made, "It must be true or false." Such an assertion is perfectly logical, but not serviceable in the sense of accurately representing our knowledge of the subject under discussion. To people of a certain type of mind there appears to be no alternative course to classifying ideas as

"right" or "wrong"; "true" or "false." Like the earliest attempts at photography their mental images are either white or intensely black, without *chiaroscuro* effects or any fine gradations of light and shade. Many years ago, in an address dealing with the nature of scientific theories, the late Professor Tyndall said: "These guesses and conjectures are by no means leaps in the dark; for knowledge once gained casts a faint light beyond its own immediate boundaries. There is no discovery so limited as not to illuminate something beyond itself." He fitly named this faintly illuminated tract "a penumbral region which surrounds actual knowledge" (*Use and Limit of the Imagination in Science,* p. 54. Longmans, 1871).

Now, anyone who knows his own mind will have no difficulty in recognizing the existence of this region of obscure thought, alike in reference to matters of science and of religious faith. And I would particularly caution the reader of these pages against any attempt to blot it out of existence by premature and arbitrary decision of moot points which are not of primary importance. It is a perfectly permissible region and ought to exist in any healthy mind. There are some few questions with which it is impossible to dally, and which must be decided one way or the other. But in very many cases such immediate decision is not imperative, and the wisest course to take is a suspense of judgment until fuller light has

been obtained. The history of science is full of illustrations of the error caused by making generalisations from a limited range of experience and wrongly assuming that the results are universally applicable. Absolute statements which leave no loophole for exceptions may sometimes be true, but they should be subjected to very critical examination before being adopted. There is no moral merit in deciding a doubtful point arbitrarily when the available evidence is conflicting and the necessity for an immediate decision does not exist.

CHAPTER II

NATURAL SCIENCE AND RELIGION

A limited measure of knowledge takes us away from God; an increased measure of knowledge takes us back to Him.[1]

HAS Natural Science anything to do with Religion? It would be very satisfactory if the exact relation of Natural Science to Religion could be expressed by a simple formula which would meet with general acceptance both by men of science and by theologians. But the present state of modern thought does not warrant such a declaration. Nevertheless, the controversies of the last fifty years have not been fruitless, and, even if unanimity has not been attained, there is evidence of a marked convergence of thought towards some general conclusions which we must now examine carefully.

Preaching in the Lady Chapel of Liverpool Cathedral, on Sunday morning, September 16th, 1923, in connection with the visit of the British Association to that city, Canon (now Bishop)

[1] This saying is attributed to Newton. Quoted from *Einstein the Searcher* (p. 47). By Alexander Moszkowski. (Methuen.)

Barnes said : "At least a generation must elapse before it is recognized that with regard to religion, science is neutral."

"Science is neutral." That is to say, the methods and results of scientific investigation do not, and cannot, supply a definite answer to questions which relate solely to matters of religious faith or doctrine, since such matters transcend the domain of Science.[1] This statement amounts to the affirmation that, notwithstanding any difficulties as to definition which may exist, the provinces of Natural Science and Theology are distinct. What follows? One inference is obvious. If this be the case, there can be no real ground of conflict between them. Should such conflict arise, it must be due to some misconception of the truth on one side or the other, or possibly on both.

It must be observed that this neutrality does not mean that scientific thought has no influence upon Theology. Still less is it meant to imply that a scientist has not the right (or duty) to give free expression to his religious beliefs ; but when he does this he is speaking from another standpoint than that of Natural Science, though this fact is not always sufficiently recognized. In

[1] Reverting to our map illustration, if we take Yorkshire to represent the domain of Natural Science a complete knowledge of the geography of that county would not enable anyone to answer the question, Is Great Britain an island? The only answer possible is, "It may be."

the report[1] of the sermon just referred to we read :

The different processes of the human mind, thought, will and feeling, cannot be decisively sundered. As a consequence, the search for truth made by men of science has in our own time profoundly affected our religious outlook. Science has not merely created a new cosmogony against which, as a background, religion must be set, but, as the character of its postulates and the extent of its limitations have become more clear, science has given us a new conception of what we mean by reasonable faith. In doing so it has strikingly altered the way in which we approach religion. Some old modes of argument and their attendant dogmas have rapidly become obsolete. Men of science can do much to help the community during the period of transition through which we are passing. Their reverence for truth can be made an inspiration of especial value to pious souls. Among men of science there is the moral austerity without which the finest intellectual work is seldom, if ever, achieved. During the last generation, moreover, they have shown a steadily increasing sympathy with religion, an enhanced appreciation of the unique power of Christianity, at its best, to serve the human race, to foster spiritual progress while preserving spiritual freedom. I would urge all men of science whom my words may reach to take every opportunity of setting forth their religious ideals, to show how, in their own minds, Christianity and science interact.

Is this opinion as to the neutrality of Natural

[1] *Nature*, September 29th, 1923 : "The Influence of Science on Christianity."

Science generally held by scientific men and by theologians at the present time? Can the provinces of Theology and Natural Science be regarded as completely distinct, or is there some intermediate territory over which both have claims?

The Provinces of Natural Science and Theology Compared.

Writing in the year 1913, the late Professor Bonney states: "For the last half-century the current of opinion, clerical and lay, has been steadily in favour of recognizing the independence of science and theology, and the distinctness of their proper provinces." (*The Present Relations of Science and Religion,* p. 198.)

In a more recent work, which for many years to come will occupy a leading place when this subject is under discussion, Professor Hobson writes:

> My main aim has been, by means of a delineation of the domain of Natural Science, to vindicate the perfect freedom of Religious and Philosophical thought from any fear of destructive interference from the side of Natural Science, subject to the sole condition that no encroachment is made upon the autonomy of Natural Science within its own domain. (*The Domain of Natural Science,* p. 499.)

I next quote the words of a well-known biologist, Professor J. Arthur Thomson:

In this book [*What is Man?*] we have attempted to consider man all round from the scientific point of view. Let us consider very briefly what this means in relation to religion. Science seeks to find out formulæ that will sum up what happens in the world of sense-experience. It tries to make these laws as clear and short and consistent as possible. Its theoretical end is to describe; its practical end is to control. It does not get much beyond saying, "If this, then that." For it deals with measurable aspects of fractions of reality; it works with "counters," such as corpuscles, which have to be taken as given; its causal descriptions are usually statements of sequence; it cannot get back to beginnings. In short, it is an abstract method of describing the routine of our sensory experience.

Now Religion implies a recognition—practical, emotional, or intellectual—of a higher order of reality than is reached in sense-experience. It sees an Unseen Universe. Religious concepts are transcendental, those of science are empirical. The aim of Science is description. The aim of religious theory is interpretation. The two may clash in *form*, but in idea they are incommensurable. (pp. 221, 222.)

These extracts, which might be considerably increased in number, point to a general agreement that the province of Science is quite distinct from that of Religion. But we must now ask rather more in detail, What is the exact province of Natural Science? Here we shall not find quite the same approach to unanimity.

The term Natural Science is generally restricted to denote the group of those special sciences which

concern themselves with what we call physical phenomena, including the cases in which the phenomena are connected with living organisms. In the somewhat narrow sense in which I shall employ the term, Natural Science excludes any direct consideration of the mental or psychical facts in living organisms from its purview; although this restriction is not universally accepted in connection with the group of Biological Sciences. It may be objected against this avowedly narrow use[1] of the term Natural Science that it implies the relegation of the mental side of life to a place outside Nature. This objection has undeniable weight. My employment of the term Natural Science, in the meaning that it denotes the Science of the physical world, is a matter of convenience only, and is not intended to indicate the acceptance of the theory that there exists any ultimate barrier between physical Nature and the mental life of man. (*The Domain of Natural Science,* p. 2.)

There is no want of clarity in this definition of the domain of Natural Science. Expressly excluding, as outside its province, all direct consideration of mental or psychical facts or states, this definition necessarily rules out any introduc-

[1] The very grave objections to this "narrow use" of the term *Natural* Science would have less weight if applied to the term *Physical* Science, which is available as an alternative designation. In a later lecture on the same topic, delivered before the University of London on November 7th, 1924, Professor Hobson employs the term Physical Science in all cases where reference is made to this domain of thought. (See *The Ideal Aim of Physical Science.* By E. W. Hobson. Camb. Univ. Press.)

tion of matters of religious belief. Thus the "neutrality" of Natural Science, so defined, is obvious. Whether this definition be approved or not, yet it is worth while noting that there is a very extensive region of scientific investigation, relating to the physical universe, which has no direct connection with religious faith of any kind.

The subject-matter of Natural Science having now been dealt with, we must next consider the precise aim of the scientific investigator. This is stated in detail in a later section (*op. cit.*, p. 81) :

> The very common idea that it is the function of Natural Science to explain physical phenomena cannot be accepted as true unless the word "explain" is used in a very limited sense. The notions of efficient causation, and of logical necessity, not being applicable to the world of physical phenomena, the function of Natural Science is to describe conceptually the sequence of events which are to be observed in Nature; but Natural Science cannot account for the existence of such sequences, and therefore cannot explain the phenomena in the physical world, in the strictest sense in which the term "explanation" can be used. Thus, Natural Science describes, as far as it can, *how*, or in accordance with what rules, phenomena happen, but it is wholly incompetent to answer the question *why* they happen.

We have here a further limitation. Not merely is a scientific investigator confined to very definite subject-matter, but the limitations of his aim and outlook are clearly indicated. We must now

enquire as to the degree of acceptance of this view.

Is Natural Science Merely "Descriptive"?

Speaking at Oxford, Dean Inge remarked, in his address as President of the Eleventh Annual Conference of Modern Churchmen:

> Some have said that all science is merely descriptive; that it explains nothing. . . . The search for general laws is not merely descriptive, because it is a search for values. . . . Valuation is as much a fact of our nature as sense-perception, and cannot be separated from it. If we think the matter out, there is no fact without a value, and no value that is not a fact. All that we perceive, we perceive as having value. . . . The statement sometimes made that science observes facts without valuing them is untrue, and it introduces great difficulties into philosophy, because it seems to justify the error that it is possible to build up a world by purely quantitative standards. All knowledge is of the quality of existents. . . . I think it very important to insist that the world as known to science is just as much a kingdom of values as the world known to religion. The difficulty is that the values are not the same. . . . Bradley says: "Goodness, beauty and truth are all there is which in the world is real. Their reality, appearing amid chance and change, is beyond these, and eternal. But in whatever world they appear, that world so far is real."

This latter quotation has been given because it would be a one-sided presentation of the case

to withhold the fact of this lack of agreement. Here we have an instance of that divergence of opinion which the reader has been forewarned that he must expect. The scientist will not deny that facts have value, but may still assert that with their value Natural Science, *as such,* is not directly concerned. It must not, however, be supposed that those writers who insist most strongly on the "descriptive" character of Natural Science are oblivious of this aspect of value.

That the aims of Philosophy and of Science are to attain to truth, independently of the specific character of the valuations of that truth when obtained, is doubtless correct; their direct concern is with cognition, and not with valuation. But for a Philosopher or a man of Science, truth is itself a value of the highest kind, even if the truth contain unpleasant features; a recognition of its immediate ideal value, or in some cases of its mediate value as a means for the attainment of practical ends, is an essential spring of action in the mind of the genuine Philosopher or man of Science. The sustained emotion which we call the love of truth as a value is essential to the pursuit of philosophical and of scientific knowledge. At every stage in the age-long struggle to reach philosophical or scientific truth the combatants have been animated and sustained by a consciousness of the value of their goal. It is, however, true that the feeling for values, or rather for specific values, is one which has to be kept in severe restraint by the investigator, in subordination to the cognitive side of his mind, for otherwise it may distort his vision in a manner which may be very detrimental to the

attainment of his aims. (Hobson, *The Domain of Natural Science,* pp. 462-463.)

Thus although the scientist recognizes "values," this recognition supplies a motive for his work but does not represent its direct aim. A part of his personality is stimulated to increased activity while another part is being correspondingly repressed. Teachers of science are well acquainted with the fact that it is not at all uncommon for a beginner in scientific work to make mistakes in his observations because he has not yet acquired enough of the scientific spirit to exercise this control to a sufficient extent. He is biassed by a preference for a certain result to be obtained often without direct consciousness of the fact that he is working under such an influence.

Somewhat similar testimony is borne by Henri Poincaré. Not only does this writer recognize the stimulating influence of a love of truth, but also that of a love of beauty, thus connecting scientific research with another of the three "ultimate values."

The scientist does not study nature because it is useful to do so. He studies it because he takes pleasure in it, and he takes pleasure in it because it is beautiful. If nature were not beautiful it would not be worth knowing, and life would not be worth living. I am not speaking, of course, of that beauty which strikes the senses, of the beauty of qualities and appearances. I am far from despising this, but it has nothing to do with science. What

I mean is that more intimate beauty which comes from the harmonious order of its parts, and which a pure intelligence can grasp. (*Science and Method*, chap. i.: "The Selection of Facts.")

Do Psychical Elements Form a Part of Natural Science?

This important question we must now consider more in detail. It is very probable that if at the present time a hundred leading members of the British Association were asked to formulate a strict definition of the term Natural Science they would fail to agree. A majority assenting to a definition might be obtained, but not without protest or qualification from an influential minority. Mental processes, and psychical states in general, are just as truly "facts" as material phenomena—indeed, our consciousness of such facts is more immediate than of those relating to the physical world. On this ground the above "narrow" definition of the province of Natural Science is strongly objected to by many scientists. Those who regard the definition as adequate do not ignore the existence of psychical elements but assert that their investigation properly belongs to another domain of thought.

The question whether psychical, or at least psychological concepts are to be admitted in Biological Science is one which . . . is related to general issues of far-reaching import as regards our general views of the world. The existence of a psychical side of at least the higher organisms is

now universally recognized, and in the case of lower organisms some rudimentary psychical elements such as bare sensation, indistinct awareness of changes in the environment, and even some rudimentary form of memory of past experiences, are most frequently assumed to be present. In so far as such concepts, of a psychical or psychological character, are employed as an essential element in the conceptual descriptive schemes of Biology, that Science does not wholly belong to Natural Science. In accordance with the meaning to which I have restricted the term in these lectures, but which restriction I have admitted to be open to very pertinent criticism, and have adopted only for convenience, Biology may, so far as such conceptions form a part of it, be described as a Mixed Science, partly physical and partly psychological.[1] (*Domain of Natural Science,* p. 351.)

Passing on to p. 354, we read :

The contemplation of the problems presented by the living organism and its relations, especially in the case of man and the higher animals, brings us face to face with the question of how the relation between the psychical and physical domain is to be conceived. It is a question which cannot be simply ignored in connection with any general view of the nature and the scope of Biological Science, although it may be very properly ignored by the

[1] See footnote on p. 27. In dealing with any branch of Science it is very important to insist, as Professor Hobson does, upon a strict line of demarcation being maintained between the data supplied by observation and experiment, which are common to all competent observers, and the efforts made to explain or interpret such data where the influence of personality may become apparent. Pure science is impersonal.

investigators in many special departments of that science. That the psychical side of a human being, and his body, which represents the construct of what we directly perceive, exercise an apparent influence upon one another is a matter of common knowledge. A change in the moral character of a man is sometimes the apparent effect of a blow on his head, which may be ascertained to be accompanied by a lesion in his brain. Conversely, a psychical disturbance, such as that produced by bad news, is apparently the cause of marked physical disturbance in the body, temporary or permanent, sometimes even of death.

We are now getting into rather deep waters, to abstruse psychological questions about which agreement is far from being complete. The reality and intimacy of the connection between the physical and the psychical is beyond doubt. The nature of it is very mysterious. It is well known that the influence of the secretions of certain glands, as, for example, the thyroid gland, is very important not only as regards bodily development but in connection with mentality and other psychical faculties. The further consideration of this matter must be deferred for the present.[1]

This brief survey will, at any rate, exhibit the complexity of the problems with which modern science has to deal.

Perhaps the reader is now feeling somewhat disappointed. We do not seem to have made

[1] See Chapter VI.: "Psycho-Physics and Psycho-Physical Parallelism."

much headway and still appear to be without any definite answer to the question proposed at the beginning of this chapter. Let us turn our attention from Science to the personality of the scientific investigator. When we speak of a man as a scientist, a philosopher, or a theologian, we merely indicate that aspect of his personality which has been most developed or a subject to which he has given the most assiduous attention. The same individual may combine all three characteristics, for some men—few in number—are distinguished in more than one of these faculties.[1] Every man is more or less a philosopher, and he is also "incurably religious" whatever form his religion may take. Men of science would doubtless agree with Dean Inge that "Valuation is as much a fact of our nature as sense-perception," but the additional clause, "and cannot be separated from it," would not meet with such ready acceptance. For we can, by an effort of will, concentrate attention upon one aspect of a subject to the virtual exclusion of another; just as an astronomer, looking through a telescope, ignores the existence of surrounding objects. However, we must here content ourselves with noting this divergence of opinion without further comment.

We have given considerable attention to the definition of Natural Science. A few words must

[1] The late Professor Gwatkin of Cambridge and the late George Salmon, D.D., of Dublin, may be cited as typical examples.

now be added on the nature of Religion, which we have here regarded mainly on its intellectual side, for it is only on that side that we can connect it with Natural Science. The general definition of Religion as being man's attitude to the universe may be objected to as somewhat vague and too comprehensive. We may regard Religion under three principal aspects which, for the sake of illustration, we will consider represented by the sides of a triangle.[1] First we have the mystic or devotional aspect which is primarily the relation of Self to God. The second side is the philosophical or intellectual aspect which we call Theology. Thirdly, we have the practical or moral side as expressed in conduct.[2] In the "perfect man" all these sides would be equally developed, but in any individual case there may be a marked preponderance of one characteristic. Thus, when we speak of a person as a "mystic," we imply that special prominence has been given to one side of the religious character. The mystic may err from a lack of rationality in his outlook, for there is always a danger of distortion when one part of the personality is disproportionately developed.

[1] An illustration suggested by *Flatland: A Romance of Many Dimensions,* where progressive development is symbolized by the attainment of geometrical symmetry.

[2] For an amplification of this brief statement the reader may be referred to an instructive passage on the nature of Religion in *First-Hand Religion,* p. 4 *et seq.* By A. Chandler, D.D.

Now, finally, let us again ask the question, Has Natural Science anything to do with Religion? Very little—very little indeed. I do not think it would be correct to say, Nothing whatever, for a reason which I will state presently. Saintly men and women are not confined to any one age nor to any one class, but are to be found among all sorts and conditions of men. It makes no great difference to moral or spiritual character what view of the physical universe forms the background of a theology. I am not morally or spiritually any the better because I have added on another cipher to my conception of the dimensions of stellar space. Moral and spiritual truths are in no way affected by such considerations nor do they alter with time. Whatever changes may take place in our intellectual view of the natural world,

> The ten commandments will not budge,
> And stealing will continue stealing.
> (J. R. Lowell.)

A consistent theist must, as Professor Gwatkin states, regard Nature as the thoughts of God expressed in things visible. Hence an educated religious man cannot be wholly indifferent to the scientific knowledge of his age. Though no man is responsible for ignorance which is unavoidable, yet no one is at liberty to reject facts or wilfully to shut his eyes to truth from whatever quarter it may come. He cannot so act without injury to his moral character. "If we

try to construct a religion without reference to what we know of the behaviour of nature, or in contradiction of what we know of that behaviour, our religion will be fatally impoverished or distorted" (Dean Inge). Would that this fact were more generally recognized! For history shows that any great truth which cannot find a home within the Church is not therefore lost to mankind, but finds a lodgment outside its pale, and is sooner or later used as a weapon against it.

CHAPTER III

NATURAL SCIENCE AND THE BIBLE

Whatsoever things are *true* . . . think on these things. (Phil. iv. 8.)

WE must now carefully consider, as part of a much larger and very complicated problem, the statements of the Bible with reference to natural phenomena. Does the Bible contain any statements, of a scientific character,[1] with regard to Nature which are valid for every age?

What is "the teaching of the Bible"? This phrase is sometimes used without any apparent realisation that behind it lies one of the most difficult of all theological problems—viz., What principles are valid as canons of interpretation of the Biblical text? It is obvious that a strictly literal interpretation, which naturally first presents itself for consideration, is not always by itself sufficient. Thus a parable has a double meaning—the simple story which forms its basis and the spiritual lesson which it is designed to teach. In some cases the inner meaning was purposely veiled from the mind of a casual reader by the

[1] "Of a scientific character." It is necessary to introduce this clause because the first verse of the Book of Genesis is a statement about Nature. But that statement is not the assertion of a scientific fact—*i.e.*, of something discovered by scientific investigation.

use of symbolic language. The early Fathers of the Christian Church, and some medieval writers, distinguished several different "senses" in which a Scriptural passage might be interpreted (Origen, St. Augustine, Thomas Aquinas). This opened the door to a very wide liberty—perhaps it would be more correct to say licence—in the interpretation of the text, and, occasionally, to the expression of very fantastic views. Thus, while the authority of the Bible was universally recognized, the various meanings which it was permissible to give to a passage tended to produce obscurity.

It is popularly supposed that the rejection of the literal interpretation of the Creation story in Genesis is due to the teaching of modern science. It is therefore interesting to the scientist to note that St. Augustine, who devoted a great part of his life to the study of that book and wrote an important commentary upon it, came to the conclusion that a literal interpretation of the text was impossible. "St. Augustine always considered as beyond doubt that the account of the Creation according to the order of the Six Days has only the appearance of history—that is to say, the chronological element in the narrative of the first chapter of Genesis, expressed by the succession of the Six Days, is purely figurative."[1] It

[1] For a critical examination of St. Augustine's views on the interpretation of the Creation story, see *Darwinism and Catholic Thought*, appendix iii. By Canon Dorlodot, D.D., D.Sc.

is quite clear that it is not to the influence of modern science that the origin of a non-literal interpretation of that story is to be traced.

Luther, in his controversies with papal delegates, took a firm stand on the authority of the Bible as superior to that of the Pope. Yet he rejected the Book of Revelation from the New Testament Canon, and, influenced by his doctrinal views on justification by faith, he spoke of the Epistle of St. James with a freedom of comment which would scandalize some of his present-day admirers.[1] It was some time after the Reformation that the doctrine of the "infallibility" of the Bible assumed a pronounced form (J. J. Lias, *Principles of Biblical Criticism,* chap. iii. : "The Inspiration of Scripture"). It is well to remember that this doctrine, born of controversy, is of relatively recent origin, and it is much to be regretted that in some quarters the implicit acceptance of it came to be looked upon as the hall-mark of true piety. Reverence for the moral and spiritual teaching of the Bible has always occupied a foremost place in the minds of believers in the Christian faith. But, by a natural process of assimilation, equal authority was also attributed to Biblical statements regarding natural phenomena, which thus received a strictly literal interpretation at a time when no adequate scientific data existed for establishing

[1] "An epistle of straw."

any alternative interpretation of a more probable character.

We are not here concerned with the general question of the correct canons of Biblical interpretation, but it should be noted that the problem to which we now turn forms part of a much larger question.

When we meet with statements in the Bible with regard to natural phenomena or, more generally, statements about matters which fall within the domain of Natural Science, how are we to regard them? Do they contain any definite teaching for all ages? In other words, are they merely incidental to, or an essential part of, Divine Revelation? Does the Bible tell us anything about the universe, of a scientific character, which we are in duty bound to accept? Up to very recent times it was generally supposed that knowledge of a scientific and historical character had been imparted to the writers of the Pentateuch by supernatural means. This view is still held by some people, and hence these questions are not superfluous at the present time. Do any sound principles of interpretation exist, and, if so, what are they? Restricting our view to those statements in the Bible which relate only to Natural Science, we may, I think, state two such principles, regarding them as a summary of the best teaching available on this point.

FIRST PRINCIPLE.—*We are not justified in looking to the Bible for any infallible, authoritative, or detailed teaching on matters of Physical*

or Natural Science which are discoverable by observation and experiment, and by the use of our reason.[1]

The references in the Bible to such matters are only to be regarded as giving the views commonly held at the time when the books containing them were written. Such teaching is devoid of authority as an essential part of Divine Revelation. Hence we need not be surprised if we find recorded in the various books contained in the Bible statements referring to the material universe which are in conflict with each other or at variance with the conclusions of modern science. Nor, in accordance with this principle, are we justified in condemning any modern scientific theory merely because it invalidates an interpretation of the Biblical text formulated and adopted at a time when the facts on which such a theory is based were unknown. The fact that certain views have been almost universally accepted for many centuries and are in obvious agreement with a literal interpretation of the text of the Bible is not of itself sufficient to establish their veracity beyond question. In what follows the truth of this principle will be taken for

[1] If any qualification of this principle is required, it is to the effect that a heightening of the moral and spiritual faculties does usually bring in its train increased intellectual power. What is here denied is that any infallible scientific knowledge has been imparted by supernatural means. The reader may again be referred to the previous note on Human Discovery and Divine Revelation (p. 15).

granted. It clears away a great many "difficulties" with regard to the correct interpretation of the Biblical text, more particularly in relation to the Old Testament. Such "scientific" statements as we there meet with were regarded as true at the time in which the writers lived. They are in no way sacrosanct because they occur "in the Bible," but are as open to scrutiny and investigation as similar statements occurring in the works of any ancient writer.

Behind all the writings of antiquity lies the idea of an old-world cosmogony now definitely proved to be erroneous. This background coloured the thoughts of the writers and gave a definite form to their phraseology. But in the interpretation of their statements on such matters the intelligent reader will make due allowance for this fact.

SECOND PRINCIPLE.—*It is an error, which cannot be too strongly deprecated, so closely to associate articles of religious belief with the scientific views of the physical universe, prevalent in any one age, that they must stand or fall together.*

The want of a due recognition of this very important principle has been, and unfortunately still is, the cause of much dissension and confusion of thought. Theology, which is our knowledge of God so far as we are able to give intellectual expression to it, and Natural Science, which, to a theist, is our partially systematized knowledge of God's works, cannot be considered

as entirely unrelated to each other. Nevertheless, inasmuch as Theology and Science view Nature in different aspects, they fall into distinct categories. Nor must we forget the important distinction which exists between Theology and Religion. In order to live a truly Christian life it is not by any means essential that a man should have an up-to-date knowledge of astronomy, geology, biology, or indeed any other 'ology. If he is in the fortunate possession of such knowledge, he will have a greatly enlarged conception of the majesty and wisdom of God and of the mystery of the cosmos. But even the crudest and most primitive ideas about the universe—the earth a central body, the sky a solid vault, and so forth—are sufficient to give point to the expressions of praise and adoration which we find in the Book of Psalms. What, then, shall be said of the vastly extended view which is presented to our minds by the revelations of modern science? All recent advances in our knowledge of Nature have led to an increased estimate of the age of the earth and of the vast distances of stellar systems. A moderate estimate of the time which has elapsed since the formation of a solid crust on the earth is given as one thousand million years, and astronomers of to-day tell us of stars whose distances from the earth exceed two hundred thousand light-years.[1] Such magnitudes

[1] A light-year is the distance traversed by a ray of light in one year, and is approximately 6,000,000,000,000 miles.

make the ancient conception of the universe seem like a child's picture. The retrospect of the growth of our scientific knowledge of the universe presents to us a series of different views, each in succession giving place to one of greater accuracy and magnificence. Is it rational to link up any one phase of this knowledge—least of all a very primitive phase—so closely with the revelation of spiritual truth, that, when one physical scheme is rendered obsolete by the growth of scientific knowledge, belief in the truth of the spiritual revelation associated with it must be given up or at least considered to be endangered?

It must be remarked that this principle applies not only to the science of the past but also to that of the present day. We cannot regard present-day science as furnishing us with a final court of appeal in relation to the actual occurrence of every event recorded in past time or as placing definite limits to the possibilities of the future. The man who takes up the position that what is not strictly in accordance with present scientific knowledge may be, without any scruple, rejected as erroneous is giving to that knowledge a position of supremacy which cannot be philosophically justified. An objection which is founded on the scientific knowledge of one age may be invalidated by the discoveries of a later time.

"Mistakes" in the Bible—What They Teach Us.

We will now examine in detail one example of the inaccuracies which occur in the text of the Bible with a view to getting insight into the way in which they should be regarded. The following statement is one of which the accuracy can easily be tested by any person of ordinary intelligence, and, fortunately, the example does not require any very detailed analysis.

In the construction of Solomon's Temple the dimensions of the great brazen laver are thus described in 1 Kings vii. 23:

"And he made a molten sea, ten cubits from the one brim to the other: it was round all about, and his height was five cubits: and a line of thirty cubits did compass it round about." (*Cf.* 2 Chron. iv. 2.)

Here we have *ten* cubits given as the diameter and *thirty* cubits as the corresponding circumference of a circular rim. As a statement of fact this is erroneous, seeing that it involves a mathematical error of over 3 per cent. Let us, however, compare the above statement with the following extract:

Among the Babylonians the construction of figures of religious significance led up to a formal geometry of divination which recognized triangles, quadrilaterals, right angles, circles with the inscribed regular hexagon, and the division of the

circumference into three hundred and sixty degrees as well as a value of $\pi = 3$. (*A Brief History of Mathematics*, p. 193. By Dr. Karl Fink. Open Court Publishing Co., Chicago.)

Here we get the explanation of the inaccuracy. The Jewish writer gives the same value for the ratio of the circumference of a circle to its diameter as was then current among the Babylonians. The legitimate inferences from the statement in the Biblical text, when tested by the historical knowledge we possess of the development of mathematical science in early ages, are (*a*) that we are dealing with a story of very ancient date, and (*b*) that the Jews were not superior to the people of other ancient nations, with whom they had intercourse, in their knowledge of geometrical science. In ancient times the correct measurement of curved lines and of the area of curved surfaces was a matter of great difficulty, and success was very slowly attained. Naturally the least accurate results are those found in early records.

If, then, the position is maintained that the Bible is "infallible," it is clear from this instance, and from others that might be adduced, that this infallibility does not extend to numerical statements. It is no satisfactory answer to say that such an error is of "a trifling character," or that "popular language" was here employed. That is playing fast and loose with the question. "Infallible" is a word of quite definite character and means "without error." If we grant the

use of popular language in one case, we are not at liberty to say that it was not also employed in other cases and with regard to matters of greater importance.

"Mistakes" in the Bible are not Blemishes.

From a literary and historical point of view these "mistakes" are not defects. Far from it. They do not in the least detract from the authority of the Bible as a spiritual guide. It belongs to the delicacy of its literary structure that these ancient ideas are preserved to us as characteristic of the age in which the records first appeared. They represent a certain aspect of truth inasmuch as they correctly portray the thought of the time. A more accurate mathematical statement would have been an anachronism in this case, and would furnish ground for the objection that the document was not authentic, or at least that it had been compiled at a date long subsequent to the period to which it relates. We ought not, however, to overlook such minute details. Let it not be said, "These are trifles." "Trifles make for perfection, and perfection is no trifle." To a scientific mind no detail, in the phenomena which are being studied, is insignificant. The greatest discoveries in science have been made by men who have had the ability to recognize small differences which either escaped the observation of other men or

had been passed over by them as negligible. And one object of scholarship of every kind is to note and, if possible, find out the significance of minute details.

It is needless to multiply examples to show that the Bible contains discrepancies relating to details of history and to Natural Science. In other words, the Bible is not infallible in such matters. Why, indeed, should it be? Why should we be saved the labour of investigation when other sources of information about these subsidiary matters are open to us? What would be the moral or spiritual value of infallible knowledge of such details? The occurrence of such "mistakes" serves a useful purpose, if only to remind us of the presence of a "human element" in the composition of the Bible. We need the reminder that the treasures of Divine Revelation are conveyed to us in earthen vessels. And we must get rid of the idea, if we entertain it, that what is truly Divine in origin is on that account necessarily perfect in form.[1] We do not blame

[1] Take one example. The whole biological record of the world testifies against this misconception of the nature of Divine activity. Perfection is to be sought in the end in view, and in the complete adaptation of the means used to attain it. Of neither of these matters are we, with our limited knowledge and faculties, in a position to judge. We must not derive our idea of Divine Revelation merely from the nature of the Divine Giver, but must also take into consideration the limited capacity of the human recipient and the needs of the age to which any part of it was vouchsafed.

a mother for not talking to a baby in faultless English.

The importance of distinguishing between what is incidental and transitory and that which is permanently valuable induces me to call attention to the work of a writer on this subject whose words will carry greater weight than any of my own. (The passages quoted below are taken from *On What Authority?* By E. A. Knox, D.D., late Bishop of Manchester. They refer mainly to the early chapters in the Book of Genesis. See chap. xiii. : "Revelation in the Bible and in Nature," pp. 207-209.)

For the purpose before us it is enough that the form in which the origins of man are presented to us in the Bible, are such expressions of Divine truth as would be intelligible to the world that first received them. We can believe it to be in its literal form inspired truth coming down to us from an age that was only beginning to grapple with the problems of life, inadequately equipped with information through the senses, or with means to test that information. For us the God-given truths that declare the relation of God to man remain unchanged, as those relations are unchanged. But we imperil the acceptance of those truths, if we put them into conflict with facts, which are truly thoughts of God expressed in things visible. The thoughts of God, and their expression to us, cannot be self-contradictory. . . . "Is this really all true?" (Genesis, chap. i.) To this question there can only be one honest answer : "This book is not written or dictated by God. It is written by men who believed that what they wrote was true. They

made mistakes about some things. But about one thing they made no mistake. They believed that God was using them to deliver a message to us about Himself. The message is there, and all God's children find it. Let us pray to Him that we may so use this book that we shall hear the message too."

The central error which must, at any cost, be banished, is that of speaking of the Bible as a revelation, whereas it is, and always has been, the *medium* of a revelation. We do not really honour God by making Him responsible either for the science or for the statements of fact contained in the Bible. The science was honest science in its day. The facts were honestly recorded. But the science and record were the science and record of fallible men. Correct science and correct history will save no man. Incorrect science and incorrect history will damn no man. But wilful blindness to truth is damning, for it is a dishonour to Christ, Who is the Truth. On the other hand, what we have in the Bible is not a mere record of what men thought or said of the world or of God. No, it is not even a record of the revelation. It is the witness of the Spirit to men of old concerning God, as they could receive it. It is interpreted to us by the same Spirit, the Spirit of Truth. Hence its authority and power. We honour God most, we show most reverence to the Bible when we so treat it.

Our false ideas about the Bible go back to the age when books were scarce, so scarce that the Scriptures could hardly be handled. It was not strange that the book should then be confused with its message; not strange that the confusion should be considered a mark of reverence, whereas it was a dishonour to the message. Especially is this true of the book Genesis, which serves admirably as an

illustration of conceptions imported from our ideas of sitting down to write a book. The only evidence which we have as to the composition of the book Genesis is that which the book itself supplies, together with that which can be gathered from the books of other nations.

"What should they know of England, who only England know?" Put "the Bible" for "England" in this question and it is still pertinent. Truth in other fields has to be won by toilsome labour—why not also in the field of Biblical interpretation? The study of Jewish and other ancient contemporaneous literature, the comparative study of religions and of the immense amount of new material supplied by archæological discoveries in Eastern lands during recent years, have thrown much new light upon obscure passages in the Bible. True, it is only the privilege of the few to deal with such material at first hand, but in no previous generation have the results of such labour been made so accessible to the general reader.

It is possible that the trend of this chapter may be condemned by some who read it as "negative" criticism. On this account it has been reluctantly written, but unfortunately the necessity for such criticism still exists. A true reverence for the Bible imposes the obvious duty of at least aiming at scrupulous exactitude in any statements made about it. And before we can appreciate the Bible for what it is, we must make clear to our minds what it certainly is not. The

charge of "attacking the Bible" is often made when the true indictment is that of challenging an interpretation of some passage which is fallacious or which distorts the real meaning. The inherent worth of the Bible is such that it no more needs artificial props to sustain its authority than the giant oak needs scaffolding to support the weight of its branches.

Let us now make a short digression and conclude this chapter on a positive note. We must not make the mistake of supposing that a high degree of scholarship is the first requisite for profitable study of the Bible. Religion is the concern of the common man and woman, "for babes and sucklings as well as for the scribes." The minutiæ of Biblical scholarship, the fine philosophical distinctions needed by the professional theologian, and intricate details of ancient history have as little to do with religion on its practical side as the latest results of modern science. All great religious teachers have insisted on the simplicity of true religion, and it will be found that the thoughts of saintly men and women usually revolve around one or two central truths. We call that man a genius who, like Newton, brings order into a mass of complex phenomena by the introduction of one general principle. What more complex than the experiences of life! And Christ reduced all spiritual life to the one principle of LOVE as the universal law which unifies existence. To those who come to the Bible with an honest heart, a

sincere desire to know *how to live,* it speaks with no uncertain voice and requires no far-fetched philosophy to interpret its message. (*Cf.* Deut. xxx. 11-14; Mic. vi. 8; Matt. xxii. 37-40; Rom. xiii. 10.)

BOOKS RECOMMENDED[1]

How we got our Bible. By J. J. Paterson Smyth, B.D., LL.D. (S. Bagster and Sons.)

Bible Study. By H. B. Gooding, M.A. (Anglican Evangelical Group Movement Pamphlet, No. 14.)

The Early Narratives of Genesis. By H. E. Ryle, D.D. (Macmillan.)

The Doctrine of the Infallible Book. By Charles Gore, D.D., and Professor H. R. Mackintosh, D.D. (S.C.M.)

The Modern Use of the Bible. By Dr. H. E. Fosdick. (S.C.M.)

The Devotional Use of the Bible. (Chap. xiii. of *The Inner Life:* Essays in Liberal Evangelicalism. Second Series.)

For a fuller list of useful books on the Bible, see *A Short Bibliography of the Christian Faith and Life* (S.C.M.), and *Bibliography for the Use of Teachers of Religious Knowledge* (S.P.C.K.).

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[1] The lists of books given here and elsewhere are purposely very short and intended to enable the reader to pursue the study of the subject treated of in greater detail. Only a few works representative of their class are included, and, since very many books of great value are not referred to, they must not be regarded as lists of "best books" on the subjects to which they relate.

CHAPTER IV

THE CONFLICT OF SCIENCE AND RELIGION

There can be no treaty between religion and science to leave each other alone.—DEAN INGE.

Every form of religion involves a theory of the universe which seeks to account for all facts relevant to religion, from whatever source they are derived.—*Ibid.*

HAVING examined the relations of Natural Science to Religion and to the Bible, we are now in a position to see more clearly the causes of the conflict between Science and Religion. This conflict was not deliberately sought on either side, but, in the circumstances, it was an inevitable outcome of intellectual progress. Apart from such references as may be necessary for the purpose of illustration, the history of this long-continued controversy will not be here reviewed in detail.[1] Virtually it has been a post-Reformation conflict. In the first fifteen centuries of the Christian era there existed no other theory of the universe than that which had been handed down from very ancient times, and which was com-

[1] For a concise account of the influence of scientific and philosophical thought on Theology the reader may be referred to *Religion and Science from Galileo to Bergson.* By J. C. Hardwick. (S.P.C.K.)

monly accepted throughout the civilized world. It was only after the Revival of Learning that scientific teaching as distinguished from theological doctrine began to assume an independent status. Even then, for a considerable period, such learning was confined to a very small class. The correctness of the ancient cosmogony was at first tentatively questioned, then openly challenged, and, by slow degrees, finally invalidated. It is manifest that such a profound revolution in thought as was necessitated by the Copernican theory could not be effected without meeting with strenuous opposition. As we have already stated, it is not between true religion and true science that any conflict can arise. This truth was clearly enunciated by St. Augustine and other writers. But it is easier to recognize the truth of a general principle than to apply it consistently in practice. By way of illustration I quote a passage from a seventeenth-century treatise where the true relationship between Religion and Science is expressed in terms which are quite appropriate at the present time :

'Tis a dangerous thing to engage the authority of Scripture in disputes about the Natural World, in opposition to reason ; lest Time, which brings all things to light, should discover that to be evidently false which we had made Scripture to assert ; and I remember S. Austin in his exposition upon Genesis, hath laid down a rule to this very purpose, though he had the unhappiness, it seems, not to follow it always himself.

. . . . .

We are not to suppose that any truths concerning the Natural World can be an Enemy to Religion; for Truth cannot be an Enemy to Truth, God is not divided against himself; and therefore we ought not on that account to condemn or censure what we have not examin'd or cannot disprove; as those that are of this narrow Spirit we are speaking of, are very apt to do. Let everything be try'd and examin'd in the first place, whether it be True or False; . . . But for every new Theory that is propos'd, to be alarm'd as if all Religion was falling about our Ears, is to make the World suspect that we are very ill assur'd of the foundation it stands upon. (From Preface to *The Theory of the Earth* (third edition, 1697). By Thomas Burnet.)[1]

Causes of the Conflict.

The primary cause of this long conflict has been the persistent tendency to interpret literally statements in the Bible referring to Nature, and,

[1] This book is an early attempt to reconcile the science of the time with a strictly literal interpretation of the Bible: leading to the description of a very fantastic cosmic scheme. It belongs to a class of literature now rightly discredited, although such attempts are still sometimes made. Works of this kind are generally characterized by a confident declaration that the long-sought-for key to the right interpretation of the Bible has been at last discovered. The arguments advanced in support of the views put forward are, as a rule, ingenious rather than ingenuous.

It is worthy of note that this author failed to find any place in his elaborate scheme for a literal interpretation of the Creation story as given in Genesis.

in addition, to claim Divine authority for such interpretations, notwithstanding the fact that some early Christian writers recognized that such a mode of exegesis was not always necessary and was in some cases clearly impossible. Through the incorporation of such statements with doctrinal teaching there was great and not unnatural reluctance to admit the truth of any new views which stood in direct opposition to established opinion. First the globular form of the earth was the subject of controversy. Subsequently, as science progressed, the conflict turned upon those results of astronomical, geological, and, more recently, biological investigation which were obviously at variance with a literal interpretation of the early narratives of Genesis. It is very difficult for us to realize the depth of the impression produced upon the minds of men, both learned and unlearned, when ideas are passed on from generation to generation without any doubt existing as to their veracity. Interpretations thus given and implicitly accepted for ages become regarded as an essential part of Divine Revelation which it is an act of impiety to call in question. In medieval times truths of religion were thought to be so bound up with the traditional view of the physical universe that they must necessarily "stand or fall together." Unless these facts are kept in mind we shall fail to do justice alike to the men who courageously opposed the false views prevalent in their age and to those men who conscientiously defended them.

In addition to this time-factor we have to remember the influence of a constantly increasing mass of Christian literature, which, for the most part, was permeated by these ideas. These ancient views were also embodied in the hymnology of the Christian Church. (Some favourite hymns in use at the present time are not free from error in this respect.)

Another cause tending to instil and perpetuate a literal interpretation of Scripture narratives was the performance of Mystery or Miracle Plays to impart instruction to the common people at a time when books were scarce and very few people were able to read them. The effect of such realistic representations was to impress crude and sometimes very coarse ideas upon the minds of the spectators.

An influence of a much more refined and enduring character is due to the genius of John Milton which found expression in *Paradise Lost*. This masterpiece strongly appealed to the educated classes in the generations which followed its publication. As the writings of a great poet tend to fix the language of a people, so they also give greater prominence and persistence to those ideas of his age which are enshrined in his poems. The influence of Milton's writings on subsequent theology cannot be overlooked, and it added weight to a literal interpretation of the early chapters of Genesis and more particularly to the doctrine of the "special creation" of species. The poet's consummate skill in the

use of figurative language glossed over difficulties which a more prosaic treatment would have made conspicuous. He thus describes the work of Creation at the dawn of the sixth day,

> When God said,
> "Let the earth bring forth soul living in her kind,
> Cattle and creeping things, and beast of the earth,
> Each in their kind." The earth obey'd, and straight
> Opening her fertile womb, teemed at a birth,
> Innumerous living creatures, perfect forms,
> Limb'd and full grown:
>
> . . . . .
>
> Now half appear'd
> The tawny lion, pawing to get free
> His hinder parts, then springs, as broke from bonds,
> And rampant shakes his brinded mane.
> (*Paradise Lost*, book vii., l. 450.)

During the sixteenth century, when this conflict was in an early stage, the doctrine of the "infallibility" of the Bible in all its statements gradually assumed a more definite form.[1] Perhaps no one is altogether exempt from the fascination of a clear-cut formula admitting of no exceptions. This sentiment exerts a powerful influence upon the minds of men who are impatient of minute qualifications and what they deem hair-splitting distinctions which detract from the symmetry and value of a rule which they regard as substantially correct.

The combined effect of all these influences was

[1] J. J. Lias, *Principles of Biblical Criticism*. See chap. iii., with numerous footnotes.

very great and tended to produce an attitude of rigid conservatism in relation to accepted views. It is evident that, in such circumstances, a pioneer in scientific investigation who was led to the conception of an order of things in Nature opposed to the ideas which had so long prevailed would meet with almost insuperable difficulty in gaining an impartial hearing for his theory. The reasons for a new view were generally of an abstruse character and only intelligible to learned men, while their obvious opposition to current theological doctrine would make theologians disinclined even to examine them at all in a spirit of serious inquiry; and, in the absence of any generally diffused scientific knowledge, it was not difficult to hold up such views to ridicule.

In no age is it easy to turn the thoughts of the civilized world into new channels. When a material body, such as a pendulum, is set in motion, that motion continues to overcome the slight retarding frictional forces for a considerable time after the initial disturbing force has ceased to act, and the greater the mass of the body the longer this motion persists. To this phenomenon of material inertia there is a mental analogue. "It is often the case in the history of thought, that when a dominant philosophy declines, many of the opinions formed under its influence illegitimately remain" (Illingworth, *The Gospel Miracles,* p. 73). What we have to deal with at the present time is a very large residue of this illegitimate influence.

For many centuries past, the cardinal mistake has been to overlook, or at least to underestimate, the influence of a distinctly human element in the composition of the Bible. Its authoritative appeal to the heart and conscience of man is unquestionable, but its spiritual teaching has been set in a framework of ideas with reference to the material universe which have no essential connection with eternal truth. But for a very long period, and to some extent at the present day, this framework has been confused with the picture and regarded as equally valuable.

Present Position of the Controversy.

In the Presidential Address at the Eleventh Annual Conference of Modern Churchmen held at Oxford, Dean Inge spoke as follows :

> The conflict of Science and Religion is still a long way from being reconciled. It is an open sore which poisons the spiritual life of the civilized world. It is difficult for a man to accept orthodox Christianity as the Churches present it to him without treachery to his scientific conscience. The injury thus inflicted upon religion can hardly be measured. (*Modern Churchman,* September, 1924.)

Turning to scientific testimony we read :

> There was a time when Theology claimed to occupy the whole territory of Natural Science, and held it in complete thraldom. The history of the

prolonged struggle of Science for autonomy on its own territory has been one in which Theology has lost every battle. Unfortunately, Science has not always remained content with the vindication of its own freedom, but has attempted to extend its dominion into territory which is not its own. There are happily at the present time hopeful signs pointing to a cessation, or at least a mitigation, of the conflict on both sides; the prevailing temper is markedly different from what it has been within living memory. There is greater readiness than formerly to admit that the conditions of life as we experience it are such that different methods are requisite for dealing with different aspects of our life and experience; and that this involves a necessity of granting freedom to those who pursue the different lines of thought and investigation appropriate to these different parts or aspects of our whole experience. (Hobson, *The Domain of Natural Science*, p. 500.)

What of the Future?

As compared with the harsh dogmatism expressed in some writings of the past, there is a refreshing candour about much of the theological writing of the present day. Doctrinal and philosophical difficulties are more frankly discussed. It is also evident from the extracts which are given in this book that the materialistic attitude taken by many scientific men during the latter part of the nineteenth century has given place to a more modest outlook and a recognition of the necessity of recognizing a spiritual element in the interpretation of Nature.

Will this conflict continue indefinitely? As long as views of Nature based upon a literal interpretation of the Biblical text continue to hold their ground—and in some minds these views still linger—opposition to such teaching on the part of scientific men is an obvious duty. Again, the advocacy of a purely materialistic outlook upon life is one which theologians are bound to condemn as opposed, not only to religion but also to sound philosophy.

Truth need not fear criticism. The attacks of Science upon Religion, or what has passed for such, can only free it from that which is false and superstitious. With increasing knowledge we may expect, at least among educated men, a diminution in the intensity of the conflict. But, as we review the history of past struggles, every marked advance in scientific knowledge seems destined to be accompanied by some recrudescence of this warfare. From time to time the frankly materialistic view of the nature of life is revived on the ground that new scientific evidence can be adduced in support of it. On the other hand, there is in some quarters a tendency to put renewed emphasis upon belief in the inerrancy of the Bible.[1] Thus the materials for a renewal of the conflict are always more or less present. Nevertheless, the outlook seems to be that both these types of mentality will

[1] To what lengths this tendency may go has recently been exhibited in America in the States of Kentucky and Tennessee.

gradually become less influential among the leaders in science, philosophy, and religion.

There is at the present time much less open antagonism between teachers of science and teachers of religion than was the case fifty years ago. Indeed, there is perhaps some little danger of overhasty compromise, for it is not desirable that such conflict should cease until the truth has been fully established. We do not *make* truth, but can only discover it; statements do not become true because men may decide, individually or collectively, to regard them as such.

The real conflict—certainly the dangerous side of it—lies in the individual mind, and the actual existence of this conflict, to a very undesirable, but largely avoidable, extent, is manifest by the prevalent confusion of thought on religious subjects. Men of science, at the present time, hold a very definite theory of the universe and of its gradual development, which, however it may be subject to future modifications in detail, is vouched for in its main outlines by evidence which cannot be set aside. It cannot be said that this view has yet been sufficiently assimilated in ordinary religious instruction, which is too often reminiscent of much earlier and now discarded theories. It is not sufficient that scientific truth should be merely admitted on sufferance. If this confusion is to cease, such truth must be very definitely recognized and also clearly taught. "Every form of religion involves a theory of the universe." If there is a marked divergence be-

tween the scientific theory of the universe and that which forms the background of theological doctrine, a sense of unreality will inevitably ensue. And I think it will be admitted that, however subordinate in importance a man's scientific outlook on Nature may be, it is the spiritual side of his personality which suffers most in such a conflict. No danger to true religion can ensue from that restatement of Christian doctrine which is more or less necessary in every age and which at some epochs becomes imperative. The scientist does not hesitate to scrap a theory when the discovery of new facts clearly proves that it is insufficiently comprehensive. But the facts upon which the discarded theory was based are not thereby changed. Nor are those racial and basal spiritual experiences upon which all religion is founded invalidated in the least degree because, through a deeper insight into their character, some restatement of doctrine has become necessary in order to give expression to a more extended and accurate view. The hopefulness of the outlook at the present time is that so many of the best theologians of the day are essaying this difficult task. It is one which requires both high intellectual gifts and deep spiritual insight. The process may be slow, but the final issue is not uncertain.

Extravagant claims have been made in the past, and will doubtless again be made, for Natural Science, but not by its foremost in-

vestigators, who are usually more impressed by the mystery and immensity of the unknown than by the relatively small knowledge of Nature as yet attained. "I do not know what I may appear to the world, but to myself I seem to have been only like a boy playing on the sea-shore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, while the great ocean of truth lay all undiscovered before me" (Newton).

BOOKS RECOMMENDED

The Present Relations of Science and Religion. By T. G. Bonney, Sc.D., F.R.S. (Robert Scott.)

Religion and Science. By the Right Rev. E. W. Barnes, Sc.D., F.R.S., Bishop of Birmingham. (Anglican Evangelical Group Movement Pamphlet, No. 39.)

The Unity of Faith and Science. By J. G. Adami, M.D., F.R.S. (Anglican Evangelical Group Movement Pamphlet, No. 51.)

CHAPTER V

EVOLUTION

CAN a Christian accept the modern doctrine of Evolution? We do not here refer to any particular form of the theory but to the general statement that man has come into being by a process of descent—or ascent, if the term be preferred—from lower forms of mammalian life. The question may be put in another form: Is such a statement true? If so, then to a consistent believer in Divine Immanence it is a fact of Divine ordinance, and, equally with any other truth, must be taken into account in his conception of Divine activity.

The great antiquity of man has now been established by evidence which leaves no room for reasonable doubt. We have got far beyond the view, commonly prevalent a century ago, of a sudden creation of a multitude of living beings brought into existence in the space of six days about the year 4004 B.C. This date, though still affixed to the first chapter of the Book of Genesis in some editions of the Bible, has not the historical value for us which it had for our forefathers.

"Probability is the guide of life" (Butler),

and the most probable interpretation of the observed facts in Nature is to be found in the teaching of men of science who have made a lifelong study of natural phenomena. When there is a consensus of opinion among scientists as to the value of the evidence and their conclusions are generally accepted, we have reached the highest degree of assurance which can be expected in human knowledge. The theory of organic evolution has so profoundly influenced the modern outlook on life that no intelligent person can afford to remain in ignorance of its leading features.[1] The evidence for its truth is cumulative and derived from many sources. One of the consequences of this theory is definitely to negative the older idea of "special creation." As opposed to this view, it asserts that all evidence points to the conclusion that every existing form of organic life, human life included, is the result of a process of very gradual development from lower to higher forms.

Great scientific discoveries have usually been preceded by vague surmises dating from very early ages which have gradually assumed a more definite form as the result of closer observation and experimental investigation. Such has been the case with the modern Evolution theory, of

[1] A good outline of the Theory of Evolution is given in the small book by J. A. Thomson and P. Geddes (Home University Library). Readers who desire a review of the evidence upon which the theory is based will find it useful to refer to *The Theory of Evolution.* By W. B. Scott. (Macmillan Co., 1917.)

which anticipations are to be found in writings of very early date. The *fact* of Evolution—as distinguished from theories regarding its *mode*—is now generally admitted. But there is still considerable divergence of opinion among biologists as to the relative importance of the different factors—heredity, influence of environment, etc.—which are concerned in the production of new forms of life.

The question put at the beginning of this chapter may seem to some readers very unnecessary at the present time. But there are yet many people who view the theory with distrust and aversion. Misconceptions as to its nature and scope, and especially as to its bearing upon Christian doctrine, are still prevalent among people who have not carefully examined the evidence in its favour. They, therefore, would answer the question with a direct negative.

Some Popular Errors.

The origin of species, which was the special object of Darwin's investigations, must not be confused with the more difficult problem of the origin of organic life, although the two problems are closely related. And it cannot be too strongly insisted upon that Evolution is a *process,* and not a *cause*. To the theist this evolutionary process represents the way in which the Creator works. The idea, at one time held, that it is irreconcilable

with the Christian faith is repudiated by the leading theologians of the present day.

Charles Darwin, notwithstanding the outcry against his *Origin of Species,* was laid to rest in Westminster Abbey only twenty-three years after it had been published; while Bishops with other clergy, in referring to that event, declared Evolution to be capable of being reconciled with Christianity. (Professor Bonney.)

Some Things that Evolution does not Teach.[1]

(i) That living or extinct forms can be arranged in a straight line of descent, each descended from its predecessor.
(ii) That "man is descended from a monkey."[2]
(iii) That God can be left out of the scheme of Creation.

To quote Davenport: "The Creator is still at work, and not only the forces of Nature, but man himself, works with God in still further

[1] From *Biology for Beginners,* p. 329. By T. J. Moon. (Harrap and Co.) The chapter from which these statements are taken contains a useful résumé of the chief factors regarded by Darwin as accounting for the production of new species.

[2] The relation of the different races of mankind at the present day to their prehistoric ancestors, and to the anthropoid apes, which in bodily structure man most nearly resembles, is best exhibited by a diagram. (See *Man and the Attainment of Immortality,* p. 65. By J. Y. Simpson.)

improving the earth and the living things which it supports."

The points regarding this theory with which we are mainly concerned are :

(1) What is the present attitude of the scientific world to Darwin's theory ?
(2) In what way is the theory of Evolution regarded by leaders of religious thought at the present time ?
(3) Assuming that the theory is not incompatible with any essential article of the Christian faith, what is the nature of the restatement of theological doctrine which becomes necessary ?
(4) Does the Evolution theory rest on well-founded evidence, or is it merely a passing phase of thought, likely to be invalidated and superseded by some later interpretation of the facts of natural history ?

The Present Position of the Darwinian Theory.

In a popular scientific periodical Professor E. W. Macbride, F.R.S., has recently dealt with this subject, and concludes his article as follows :

To sum up, we find that in its general outlines the Darwinian theory of evolution is as securely based as ever it was. "Natural Selection" deter-

mining the survival of the functionally efficient, and inheritable variability bringing about changes in function and the structure relating thereto—these are the corner stones of Darwinism, and nothing has transpired which can shake them.

Doubtless Darwin was mistaken in drawing too close a parallel between the monstrosities of domesticated breeds and the adaptational peculiarities of wild races exposed to the fierce struggle for existence, but nothing would have horrified him more than the idea that every detail of the argument set forth in the *Origin of Species* should be regarded as the last word on a subject of which, as he himself saw, our knowledge was only beginning. (*Science Progress,* July, 1923.)

We can only take this statement as adequately representing current opinion among men of science if we lay stress on the words "in its general outlines." For, as Professor J. A. Thomson points out, "The scientific study of organic evolution is still very young. There are many uncertainties, there is rapid progress along diverse lines, there are not a few moot and controversial points."

The General Tendency of Evolution.

Evolution in the past has been, on the whole, towards integration, towards increasing fullness, freedom, and fitness of life. There has been "a constant if chequered advance." Will it stop?

Man's highest conception, his conception of God, must enlarge as his thoughts are widened. But surely it is interesting that the modern idea of a God—a God of Evolution—brings us back to the

God of our fathers, whose name Jehovah—the scholars tell us—meant, not, "I am that I am," but, "I will be what I will be." (Professor J. A. Thomson, *What is Man?* p. 223.)

The Origin and Nature of Life.

The mystery is still there, and will ever remain, but the steps by which the beauties of creation were developed, and are still developing, are becoming visible; and the vision fills every thoughtful mind with greater reverence for a power and a glory more fully revealed. No single creative act could fill the mind with half the awe and admiration evoked by this spectacle, in the heavens and upon the earth, of continuous evolution of wonder upon wonder. Scientific myth and religious myth of past ages are alike to be honoured and preserved as the best attempts of the knowledge, or science, of past ages to look up to this mystery, to understand it, and to worship the highest. It becomes no man to scoff at these things, and the labourer in science who gets so lost in mechanical detail that he has no mind left for the grandeur of the whole design for which detail only forms the substructure, could he but appreciate, would gain in inspiration and incentive from a sympathetic touch of faith in that spirit which breathes through the whole universe, and gives life to his mechanisms. (Benjamin Moore, M.A., D.Sc., F.R.S., *The Origin and Nature of Life,* p. 160. Home University Library.)

The same writer thus concludes his book on this subject:

Here, then, we stand at the end of our review of inorganic and organic evolution, and of the origin

and nature of life. There is continuity and consistency in it all; there is beauty and design in it.

There is a scheme in it all and an eternal purpose which is ever progressing. It means something that this much has been revealed to us, and having once seen it there comes a touch of illumination and faith, that kindles something sacred within the mind akin to reverence and love. One must needs work for the highest and for more knowledge of this revelation, whatever the future may hold in store, for we do not now know how more and more glorious things may yet be. (p. 253.)

Some Objections to the Theory of Evolution.

Reference has been already made to the fact that some people still regard the theory of organic evolution with distrust. Let us now examine one or two of the non-scientific objections urged against the theory—"non-scientific" they must be called, since science is an unbiassed search for truth quite apart from the attractiveness, or unattractiveness, of the results obtained.

"But the idea that any of the lower animals have been concerned in any way with the origin of man—is not this degrading?"

This is an old objection, brought forward in the period between Lamarck and Darwin. Should not a work be judged by the value of the result rather than by the nature of the process? Can we not conceive it possible that God may regard the lower animal creation as fulfilling a purpose

of which we are ignorant?[1] We have but glimpses of a cosmic plan which is only partially revealed to us. Have we any real belief that the thoughts of God possess a character differing from our own, and, above all, are infinitely more comprehensive? (Isa. lv. 8, 9.) If all this elaborate antecedent preparation, extending over many millions of years, proceeding step by step from one animal form to another in ascending degrees of capacity and endowment, was to reach its culminating point in the appearance of man upon the earth, with psychical endowments capable of unknown development, this at least suggests that a high value attaches to the product of so much labour. Can we wonder if to some minds this scientific exposition of the story of Creation makes it appear a process of much greater majesty than that which entered into the mind of the Hebrew seer? Does not the vast scale on which Creation is planned impress us more strongly than ever with its fitness as the work of an all-wise and almighty Author?

But let us get down to some facts which are incontrovertible. Embryology proves conclusively that every individual human body does actually possess some characteristic features of the forms of lower animals before being permitted to see the light of day. (This is just one of many

[1] A very impressive passage on the mystery of the animal creation, by a writer who had no scientific bias, will be found in *Parochial and Plain Sermons,* by J. H. Newman, D.D., vol. iv., p. 205 *et seq.*

facts concerning the human frame which, like the occurrence of "vestigial" structures in the human body, appear quite inexplicable apart from the light which the theory of Evolution throws upon them.)

There is also in this prejudice an element of unkindliness towards the lower animals which is utterly out of place. These creatures are all of them products of the Divine Conception, as well as ourselves. All of them have had assigned to them by their Great Father a part in the drama of the organic world, as well as ourselves. Why should they be held in such contempt? It is much to be feared that with this proud prejudice is connected much of that inhumanity which is shown to the inferior animals, and which tends to degrade man himself below them. Let us regard them in a right spirit, as parts of a grand plan which only approaches its perfection in ourselves, and we shall see no degradation in the idea of our genetic connection with them.[1]

But the major objection is that which has been urged against nearly every important scientific discovery—"It contradicts the Bible." Now it must be frankly admitted that the acceptance of the Evolution theory is quite incompatible with a strictly literal interpretation either of the account

[1] *Vestiges of the Natural History of Creation,* third edition, p. 241. This book was first published in 1844. Lamarck's theory of organic evolution preceded that of Darwin by fifty years, but was more speculative in character and not based on satisfactory evidence.

of man's creation or of the story of the Fall as given in the book of Genesis. But, as already stated, the question thus turns upon the validity of a specific form of interpretation given to those narratives. We must ask ourselves, Does this account (Gen. iii.) represent an actual event occurring in the lives of two individual human beings; or is it a parabolic representation of a spiritual experience common to the human race? By way of answer I quote from Bishop Gore's writings.

Evolution and the Story of the Fall.

If you read this third chapter of Genesis as being not history, but what the early Christian Church suspected it of being—"moral teaching in the form of a story"—you will be amazed at its truth. Here we have in a symbol the story of sin as it is all the world over. The suggestion from outside—the tampering with conscience—the false idea of liberty—the act of rebellion—the mutual encouragement to sin—the sense of shame—the consciousness of having lost our true birthright. Could any boy or girl be taught to read this story, as a story with a moral, not as ancient history, without feeling its penetrating force? Adam and Eve are every man and woman, and their experience the experience of everyone who sins. I am tempted to say that if any part of the Bible is manifestly inspired by the spirit of truth, assuredly this one is. Certainly here is the true account of sin.

It is very often said, "The Bible and the Church teach that mankind began at the top—in a state of

perfection—and fell to the bottom. But science teaches us that mankind begins at the bottom and slowly climbs to the top." This is not the case. It is true that John Milton, the theological poet of Puritanism, and other theologians have taught that Adam was possessed of the fullest enlightenment as well as the most perfect virtue. But the Bible does not suggest it. And when the wise thinkers of the early Church were asked whether man was created perfect, they answered, "No. He was created with a capacity to acquire virtue and to move towards perfection." (*God in Christ*, pp. 17, 18. Mowbray and Co.)

Other writers might be quoted to the same effect. It is interesting to note that the theory of Evolution lends support to an early interpretation of the Biblical text. Insistence upon the accounts given in the early chapters of Genesis as representing actual historical events is not the teaching of the universal Church, however firmly this opinion may have been held by some sections of it.

(Several passages bearing upon this subject from the theological point of view will be found in *Belief in God*, by Bishop Gore, chaps. i. and vi. A fuller treatment of the story of the Fall by the same writer is given in *Belief in Christ*, chap. ix.: "Sin and the Fall." See also *On What Authority?* by E. A. Knox, D.D., late Bishop of Manchester, chap. xiii.: "Revelation in the Bible and in Nature.")

Whilst the discoveries of the last fifty years have tended to establish more firmly the fact

of Evolution, Darwin's theory has undergone considerable modification in several respects.[1]

(*a*) It is now recognized that in describing the struggle for existence—largely an unconscious struggle—scientists, poets, and prose-writers have unduly stressed the amount of animal suffering in the world, and have often overlooked the function of pain as educative and protective.

(*b*) It was natural that in the consideration of the problem of the survival of the fittest attention should be first concentrated on favourable bodily characteristics such as fleetness of foot, capacity for obtaining food, etc. But in the higher forms of mammalian life care for the young involving consciousness and the exercise of volition must be taken into account. That species of which the young are most carefully tended has the best chance of survival. The influence of this altruistic factor is not negligible.

The ideal of evolution is thus no gladiator's show, but an Eden; and though competition can never be wholly eliminated—the line of progress is thus no straight line but at most an asymptote—it is much for our pure natural history to see no longer struggle, but love as "creation's final law." (*Evolution,* by J. A. Thomson and P. Geddes, p. 247.)

[1] We are here concerned with those general features which bear upon the relation of the doctrine of Evolution to religious thought. For the influence of Weismann's theory of germ-plasm and of Mendelism upon the theory of Evolution larger works must be consulted.

(*c*) In human development the great importance of the mental aspect of Evolution has become more generally recognized. In bodily form there is relatively little difference between prehistoric and modern man.

Since prehistoric man, some hundred thousand years ago, attained the bodily structure which man to-day possesses, there has been no further development of that structure—measurable and of such quality as separates the animals nearest to man from one another. Yet man has shown enormous "progress" since that remote epoch. *The brain and the mental faculties connected with it have become the dominant and only progressive "evolving" attribute of man.*[1]

There is no justification for the view that man originally received any deposit of infallible knowledge about the natural world, about himself, or even about the nature of God. All the evidence, literary as well as scientific, tends to show that physically, mentally, and spiritually the task has been committed to him of "working out his own salvation" from small beginnings but under Divine guidance which, in a large measure, he is at liberty to accept or to reject.

An individual to whom the theory of Evolution is unfamiliar and perplexing may be justified in

[1] Sir Ray Lankester, *Great and Small Things*, chap. vii. See also the chapter entitled, "Is Nature Cruel?" Brain development is specially dealt with in *Essays on the Evolution of Man.* By G. Elliot Smith.

leaving it out of consideration. But he is certainly not justified in condemning those who hold it as the result of patient study and investigation. For those who at the present time are leaders of thought, and to whom is committed the task of moulding the thoughts of a succeeding generation, this question assumes a different aspect and cannot be ignored. For the theory has come to stay. Like the Copernican theory in astronomy, it marks one of those great intellectual advances in the development of human thought which occur at certain epochs. The theory of Evolution will doubtless undergo further modifications as knowledge increases, but it is never likely to be altogether discarded. Among biologists there is practical unanimity upon this point.

Every important scientific theory, which has been ultimately accepted as embodying truth, has passed through three stages. Firstly, a period of *opposition* in which it has been adversely criticized by men of science as well as by the general public. Secondly, a period of *toleration* when the weight of the evidence in its favour has become more generally recognized, though during this stage the influence of an older view has still remained dominant. Lastly, a period of *assimilation* in which there has been a restatement of doctrine in such a way as to incorporate the newly discovered truth. Among educated men the theory of Evolution has now reached this final stage. The story has been inscribed on the rocks of every continent, written,

as a consistent theist might say, "with the finger of God."

"THE MANUSCRIPTS OF GOD."

MAY 28TH, 1857.

Verses on the fiftieth birthday of the naturalist Agassiz, by Longfellow. (Slightly abridged.)

It was fifty years ago,
In the pleasant month of May,
In the beautiful pays de Vaud
A child in its cradle lay.

And Nature, the old nurse, took
The child upon her knee;
Saying: "Here is a story-book
Thy Father has written for thee."

"Come, wander with me," she said,
"Into regions yet untrod;
And read what is still unread
In the manuscripts of God."

And he wandered away and away
With Nature, the dear old nurse,
Who sang to him night and day
The rhymes of the universe.

And whenever the way seemed long,
Or his heart began to fail,
She would sing a more wonderful song,
Or tell a more marvellous tale.

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Man and the Attainment of Immortality. By J. Y. Simpson, D.Sc., F.R.S.E.

What is Man? By J. Arthur Thomson, M.A., LL.D.

The Making of Man. By Sir Oliver Lodge.

CHAPTER VI

THE NEW PSYCHOLOGY AND RELIGION

BEFORE going on to examine a more modern phase of the conflict between science and religion, let us take our bearings by a brief retrospect of its past course. With varying degrees of intensity this controversy has now been going on for more than three centuries. History has been defined as "Philosophy teaching by examples." Historical studies enable us to realize more fully the immensity of our indebtedness to the past; they enlarge our individual experience and give more balance to our judgment. Especially in an age of transition do we need the lessons which history can teach—to learn, in Emerson's fine phrase, "to listen to the centuries against the hours." We may thus avoid what Dr. Fosdick calls the fatal bigotry of understanding nothing but contemporary thought.[1] Each generation must needs grapple anew with all the great problems of life, and the history of intellectual development may be compared to an ever widening and ascending spiral, bringing again into view the same land-

[1] *The Modern Use of the Bible*, p. 96.

scape seen from the higher altitude and bounded by a more distant horizon.

Time was—before the birth of Newton and the introduction into science of the idea of gravitation—when men shrank from the idea of a globe-shaped earth, not only from the supposed peril to their bodies but also influenced by the idea that such a belief endangered the salvation of their souls. That view no longer troubles anyone. Then the discovery, that the earth was not, as was generally supposed, the greatest material body in the universe with smaller celestial bodies in attendance upon it, produced great consternation, which was only very gradually allayed. But it does not now disturb our faith even to be told that our world is but "a dwarf planet revolving about a dwarf sun," and that there are tens of millions of such suns in existence in the depths of space, many of them very much larger than our own luminary. Again, the idea that the earth was not suddenly created about the year 4004 B.C., but had been in existence for millions of years perplexed the minds of some of our not very remote ancestors. The shock of that discovery has likewise passed away. More recently, to learn that man himself was not brought into being, in an adult form, by any act of "special creation," but that his advent was the result of a long antecedent preparation through lower forms of animal life, raised a storm which was in progress during the youth of the writer of these pages. But of that

storm even the distant rumblings are now scarcely audible. Educated men, at least, are now able to see that there is nothing alarming—nay, rather a revelation of something more majestic—in this version of the story of Creation.

To sum up. In the mind of the theist the general result of this unveiling of the past has been to produce the conviction that the Divine purpose in Nature is on a far grander scale than our forefathers thought possible. It adds but new emphasis to the words of the ancient hymn, "Heaven and earth are full of the Majesty of Thy Glory."

When we compare, not one year with another, but the outlook of one century with that of the preceding century, we are better able to estimate the progress which has been made. The sciences of Geography, Astronomy, Geology, and Biology have each in turn provided ground for controversy owing to the fact that religious doctrine had incorporated ideas which did not properly belong to it, and from which it required to be set free. There is something suggestive in the successive phases of this conflict. The first three of these sciences are purely physical, and therefore not immediately concerned with man's nature. Biology, with which we must logically include Palæontology, brought into prominence the close relationship of man's bodily organism to that of the higher mammals. The comparative study of bodily structures, bone by bone, muscle by muscle, and nerve by nerve, forced upon scientists

the conviction that similarity of structure implied community of origin. In later years this knowledge has been extended by the study of closely allied psychical faculties.[1]

To-day we are faced with fresh problems due to the marked advance made in psychological investigation. Psychology deals not merely with man's thoughts, but with the play of his emotions and the energy of his primary instincts. Hence the connection of psychology with religion is far more intimate than with any branch of physical science. To-day we are told—by one school of psychologists—that the dragon of science will now succeed in the attempt to devour the sun of religion. To change the figure, it is said that whereas in former conflicts no mortal wound had been inflicted, in this renewed encounter a blow will be struck at the heart of all religious belief and administer the *coup de grâce*. In an age like the present, characterized by extremist views of so many different types, such an assertion must not be taken too seriously. Certainly no instructed man will tremble at the prospect or—to quote again words already used—"think that all Religion is tumbling about our Ears." The presumption, based upon experience of the past, is that this conflict will come and that it will as certainly go. But that it will not be without influence upon religious thought is quite certain.

[1] For examples of animal intelligence and behaviour, see *The Minds and Manners of Wild Animals*, by W. T. Hornaday. (Scribner's Sons.)

We may reasonably anticipate that when the glamour and exaggerated anticipations which always accompany a new and fertile discovery have passed away the result will be a residual gain, leaving behind it a useful contribution to religious thought, and a faith, purified from some accretions, still more firmly established. But the reader may naturally ask for some other justification of these views than mere general assertions. Let us, therefore, examine this matter rather more closely.

The New Psychology.

We are here again confronted with our now familiar "boundary problem." Fifty or sixty years ago the expressions "to have in mind" and "to be conscious of" were regarded by psychologists as practically equivalent in meaning. To-day that is not the case. We may "have in mind" many things of which we are not directly conscious. It is this extended conception of the meaning of the word *mind* which mainly distinguishes the new psychology from the old. Mind is now regarded as comprising both a "conscious" and a "subconscious," or, as some psychologists prefer to call it, an "unconscious" region. The illustration most usually given is that of an iceberg floating in the sea, the upper part of which represents the conscious, and the submerged part the unconscious mind. But to make the illustration more adequate, we

must imagine the particles of the iceberg to be capable of internal motion so that there is a constant interchange going on between the particles in the upper and those in the lower portions. From time to time there is emergence from the unconscious into the conscious region and conversely. And again, not content, like the earlier psychology, with tabulating and describing the scope of the different mental faculties, the new psychology treats the mind as a living organism and seeks to trace its modes of action. A quarter of a century ago the discovery of radium opened up to the scientist a new and unsuspected domain for investigation, the results of which have been very far-reaching, and have profoundly influenced his view of the material universe and his conception of the ultimate nature of matter. In like manner this discovery of the "unconscious" mind has opened up a wide field of research to the psychologist, and has very greatly enlarged and transformed his outlook on mental processes.

To use a familiar phrase, the New Psychology as a science is yet in its infancy. A strict definition of the science, meeting with general acceptance, is still wanting, and its terminology is yet in a state of flux—that is to say, is not definitely fixed by agreement among leading psychologists. The same term may be used in different senses by different writers. There is still much diversity of opinion in the interpretation of results and as to the relative value of the different methods

employed in research. Such experimental processes as are available are yet in a tentative stage, and it is scarcely possible to listen to a lecture by any leading psychologist without hearing the views of some other investigator called in question. These statements are not made with any intention to belittle the importance of the study of this subject but to forewarn the reader that in the earliest stages of so abstruse a science he must expect to meet with much diversity of opinion.

While this marked disagreement exists it is quite premature to speak of "the conclusions of psychological science" as we might do in the case of an older branch of science, such as Astronomy or Geology. Indeed it is questioned by some writers whether psychology has any right to the name of a science. Even if this point be conceded, it is a science yet in a very early stage of development. These points must be carefully kept in view when statements are made as to the bearing of psychological investigation on religion. It is very easy for a writer to pass over the border from the region of established psychological data into that of their philosophical interpretation. Undoubtedly this has been done in a very arbitrary and speculative manner by some psychologists who have dealt with the religious aspect of their investigations.

The importance of a knowledge of psychology is increasingly recognized. But there is perhaps no subject to which the adage applies more

pertinently that "A little knowledge is a dangerous thing," or of which a mere "smattering" is so worthless. Yet if the student is prepared to undertake the labour of serious study over a sufficiently wide field, he will find the subject of great interest and of considerable value in daily life.

As regards the relation of the New Psychology to Religion, if the reader has fully learned the lesson of past controversies, and, above all, if he has an assured conviction of the independent foundation upon which religion rests, he can await the result of present-day discussions on the subject with an unperturbed mind. It is in the infancy of a new branch of science, as the history of Natural Science shows, that affirmations concerning its subject-matter assume the most positive character. As the knowledge of the science advances these ultra-positive statements become modified and amended. It may therefore be a considerable time before the true relation of psychological science to religion can be formulated with any satisfactory approach to accuracy. Certainly at the present time this cannot be done, but even now it is recognized that recent investigations have made to religious thought valuable contributions which it is the province of books on the Psychology of Religion to deal with in detail.

It is unfortunate, but apparently inevitable, that public attention is always most powerfully attracted by the views of extremists, and hence

the popular conception of the trend of scientific opinion, and especially of its most recent advances, is often merely a travesty of its real meaning. With the diffusion of more accurate knowledge, and only in that way, can the influence of such errors be counteracted. There is ground for anxiety as to the effect of the impact of erroneous views upon uninformed or ill-informed minds, not in a position to appraise them at their true value. The real danger lies in the insidious temptation to make conflict of opinion among learned men an excuse for laxity and indifference with regard to the permanent moral obligations of life.

But it may be asked where and how the teaching of the materialistic school of psychologists comes into conflict with religious belief. It is well that these skeletons in the cupboard should be brought out into the full light of day. The following list of propositions, embodying the tenets of Freud and his followers, is given in *A Neglected Complex and its relation to Freudian Psychology*,[1] by W. R. Bousfield, K.C., F.R.S.

1. There is no such thing as moral responsibility.
2. There is no survival after death. The mind ceases to exist when the physical brain is destroyed.

[1] The aim of this book is to show, by a detailed examination of the Freudian position, that "it is possible to get all the therapeutic advantages of Freud's discoveries without incurring the consequences of his materialism."

3. Free will does not exist. Our thoughts and actions are controlled by strict determinism.
4. There is no God and no such thing as spirit except as a function of matter.
5. There are no means of cognition other than the physical senses. Telepathy is non-existent.

Many (psychologists) are obsessed by 1 and 2, some add No. 3, fewer still add No. 4, Freud and his strict followers have the whole five, though there are signs that No. 5 is disappearing from Freud's complex (p. 38).

Moral Responsibility. Psycho-Physical Parallelism. Determinism.

The above summary shows us clearly with what we have to deal. It is obvious that the first of these statements cuts at the root of all religion. No. 3 is virtually an amplification of No. 1. This leads us back to the problem of the relation of the physical to the psychical to which reference has been already made as being one of the most difficult problems in psychology. As with many "questions of the day," this problem dates back to a remote past, and can only be seen in right perspective when viewed in the light of history and not merely regarded as a phase of modern thought.

The problem of the relationship of mind and body is one of the oldest of philosophical problems, and its solution is no nearer to-day than it has ever

been. That mind and body *have* a very intimate relation will not be denied by anyone. It is perfectly obvious that mental processes and physiological processes are often very closely connected, that psychical changes and physiological changes often accompany one another in a perfectly definite way, and that mental processes are both initiated and followed by events in the external world in definite sequences. This relation of the physical and the psychical is closest, of course, between the mind and the central nervous system. The brain has, in fact, been regarded by some as the organ of mind in the same sense that the stomach and intestines are the organs of digestion, and this view has been expressed in the aphorism that "the brain secretes thought as the liver secretes bile." But the most materialistic philosopher must recognize that thought and emotions are phenomena essentially distinct in their nature from physiological phenomena, however closely thought and emotions may be accompanied by physiological changes in the nervous system. Thought and emotion, as we know them, are absolutely *sui generis*, and we do not get the least nearer to an understanding of them by believing, (or for that matter by disbelieving,) that they are products of brain processes. The nature of the connexion which certainly exists, is absolutely beyond our ken. (A. G. Tansley, *The New Psychology*, p. 16.)

There is much force in the contention that the whole problem of the relations between the physical and psychical domains in the living organism is essentially insoluble because the problem is a purely artificial one, having arisen from the original assumption made that the psychical and the physical sides are disparate, without an under-

lying unity. If it be held that we have, in treating body and mind as belonging to separate domains, set up a distinction which does not correspond to any really fundamental difference, this may be held to account for our inability to formulate any satisfactory and coherent theory of the relations between the two artificially separated domains. (Hobson, *The Domain of Natural Science*, p. 69 *et seq.*)

The important point to be noted is that the nature of this connection is quite unknown. But because a problem appears insoluble, it does not follow that the study of it is fruitless. It must, however, be remembered that any positive statements about that connection have, at present, the character of unproved assumptions. We may imagine a possible connection and, regarding it as a "working hypothesis," deduce the logical consequences which result from so doing. These inferences must then be brought to the test of experience. More than one such theory has been formulated.

Psycho-Physics. The introduction of the term Psycho-physics to denote the relation of the physical and psychical, in the widest sense, dates back to the latter part of the nineteenth century. (Merz, *History of Scientific Thought in the Nineteenth Century*, vol. ii., chap. xi. : "On the Psycho-Physical View of Nature.")

Psycho-Physical Parallelism. This term has been used to express the idea that "every mental phenomenon must have a physical correlative." This statement is highly probable and is generally

admitted. But the definite theory to which this phrase is now applied embodies the speculative and very definite assumption that no causal connection of any kind exists between the two classes of phenomena. In other words, psychical processes and states—thought, feeling, and desire—are to be regarded as merely concomitant with physical manifestations, and as without any influence upon their occurrence. The relation is thus one of complete independence. If the question be put, "Am I a being so constituted that I am morally responsible for my actions?" then this theory answers that question by a direct negative. Now a man's conduct or behaviour is always made manifest to others by physical actions of some kind. And if we deny that any psychical factor determines his actions, it leaves us with human behaviour as a mere sequence of physical phenomena. But such sequence follows necessarily as the inevitable consequence of preceding physical conditions, and is therefore independent of the volition of the individual in whom it is produced.

In accordance with this view, if we possessed a sufficiently advanced knowledge of Physiology, a complete account, involving only the categories of Physics and Chemistry, could be given of all the actions of a man, of all his responses to external stimuli, without taking into account his consciousness or will, or any of the motives to which he himself attributes his actions.

His cognition, feelings, and conation are, in this theory, regarded as belonging to a domain which

has no influence upon the world of physical phenomena, including all the physical happenings in his own body; the former are regarded as epiphenomena or Begleiterscheinungen,[1] which accompany but have no influence upon the latter. The man is a conscious automaton, a machine endowed with consciousness, but not with the power to influence his own actions; although he is under the delusion that he has this power. . . . Whatever be the value of this theory, it certainly makes colossal demands upon our powers of imagination. (Hobson, *The Domain of Natural Science,* pp. 66-67. For a fuller discussion of the difficulties involved in psycho-physical parallelism, see the continuation of the above paragraph on p. 67 *et seq.*)

The "conscious automaton" theory is another name given to psycho-physical parallelism. It is usual, after developing the consequences of any theory, to appeal to experience as a test of its accuracy. But here we are in the peculiar position that, as in Freudian psychology, this appeal is rendered nugatory because the conscious experience is dismissed as an illusion. But, from a common-sense point of view, this position leaves the consistent psycho-physical parallelist with some very hard nuts to crack. Not only is the human automaton blessed (?) with a conscious-

[1] Literally, companion-appearances. An epiphenomenon means "something added on" with the idea that the addition is unimportant. We may illustrate this by referring to the shadow cast by the figure of an athlete running on a sunlit track. Obviously the presence of the shadow has no influence on his pace.

ness which is persistently untruthful—automatically, of course—but he is gifted (at least, some automata are) with an intelligence that informs him that his consciousness is untruthful. As this intelligence is a part of his consciousness, we are forced to consider the whole consciousness as consisting of two discordant sections, witnessing against each other. Since it is logically impossible for two opposing witnesses both to be truth-telling, we are entitled to ask whether the latter part of the consciousness is trustworthy enough to pronounce a verdict of condemnation on the former.

The critics of Freud do not underrate the value of his work as a pioneer in psycho-analysis, nor the importance and significance of the evidence which he adduces in support of the deterministic theory of human behaviour. But they repudiate his interpretation of the results and especially his wide generalisations. The following quotation is relevant as a reasonable criticism of the position taken by determinists :

> Nine-tenths of our lives are governed by determinism from the unconscious. All the habits of action and thought which we painfully acquire and which become rooted in the unconscious form determinants which are the background of every well-ordered life. We learn with effort to walk, to talk, to write. We acquire habits of thought, of self-control and of concentration. And this substratum of deterministic or automatic thought and action relieves us from conscious effort of will in most of the actions of daily life. Here is a far

wider ground of determinism than is illustrated by the narrow field of chance and faulty actions.

But it is obvious that this extended area of determinism, in which the will does not come into play, furnishes no argument against the operativeness of the will when it is used. All this useful determinism[1] sets us free to grapple with things in which the will does come into play. The fact that nine-tenths of our lives is automatically determined from the unconscious without voluntary effort cannot be used to show that in the remaining tenth of life the will is inoperative, except to a mind governed by the materialistic complex.

. . . . .

The fact remains that psychology gives no real support to the view that the notion of free-will is illusory, whilst the experience of life is strong evidence to the contrary. (Bousfield, *A Neglected Complex*, pp. 46-47.)

It is instructive to compare the position taken by the believer in Christian Science with the attitude of the Freudian psychologist. Extremes meet. Christian Science says to a patient, "You think that you are ill, but that is an illusion. The illness exists only in consciousness but has no objective reality." Psycho-physical parallelism and Freudian psychology similarly assert, "You think that your will is free and that volition determines your conduct, but that is an illusion. The idea of freedom exists in consciousness but has no real influence on behaviour."

[1] It is evident that much of this "useful determinism" is the result of previous acts of volition. E. H.

Monism.

In both these systems of organized thought there are undoubtedly elements of truth which give them a measure of plausibility and account for the influence they exert on public opinion. Their aim is philosophical in character—to unify experience. Moreover, it is evident, from the works of many writers, that there is a growing conviction that the division into the "psychical" and the "physical," which we are at present compelled to make, may be phenomenal rather than real, and that if our vision were more comprehensive, this view would be superseded by some form of Monism which would incorporate both. But of this problem, as Professor Hobson states, "No even tolerably complete solution is in sight" (*The Domain of Natural Science,* p. 357). When, however, we have reached the stage that mass is regarded as a form of energy, the partition between the two regions is growing very thin. We have also to take into account the increasing evidence of the influence of mind upon matter.[1]

We must, however, reject as unphilosophical

[1] Telepathy, for the existence of which there is a very large amount of evidence, may be an instance of the direct influence of mind upon matter. We certainly cannot say that the function of the ether is confined merely to the transmission of electro-magnetic waves. There may be pulses of a different character of which we are at present entirely ignorant. But, at present, such views are purely speculative.

the intellectual "short-cuts" which lead to an impasse, for we cannot rest satisfied with a pseudo-Monism which rules out either side of our conscious experience. The materialist ignores the psychical, brushing it aside as unimportant, while the devotee of Christian Science exalts the psychical with a corresponding neglect of the physical. Perhaps it is not unfair to regard these different attitudes of mind as conspicuous instances of "the worship of detached ideas." In any case, it may be safely asserted that the student of psychology who derives his knowledge of the subject solely from the writings of the materialistic school has no adequate conception of the present state of mental science.

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CHAPTER VII

HUMAN POWER OVER MATTER. "LAWS OF NATURE"

We are quite conscious that we possess some power of voluntary action which affects material things.[1] But a little consideration will show that the range of such action is very limited, for by far the greater part of what takes place in nature and in our daily life lies altogether beyond our control. Let us consider carefully what are the exact limits to the power which we can exert over matter. In so far as we are able to exercise any control over material things, all that we can do may be expressed in a very few words: *We can move things about.* Merely that, and nothing more. This is a fact we must not lose sight of. Let the reader pause for a moment and reflect upon his own actions during any one day from its beginning to its close, and he will find that the above short statement sums up all his activity in so far as it relates to matter. Reflection makes it obvious that whether a man be a clever artist, a brilliant musician, a skilful surgeon, a scientific investigator, a workman in

[1] It will be observed that the writer here repudiates Determinism.

a factory, or engaged in any other occupation we choose to think of, yet in following any one of these pursuits he can do nothing more with any material things which he handles than to change their position. All that afterwards ensues follows automatically and invariably from the properties they possess, and which he cannot in any way alter. As one of our earliest lessons in moving things about, we put food into our mouths. But the intricate reactions by which that food nourishes the body are beyond our control and not fully known to us. Taught by experience, we may indeed modify or check the effect of our first action by subsequently moving something else. When we say that "Knowledge is power," we mean that we have discovered the right way of moving things about in order to obtain some desired result. We are thus progressively "subduing the earth" and making its material resources minister to our welfare or pleasure. Recent discoveries in wireless telegraphy and telephony may be alluded to by way of illustration. Thus our physical well-being depends largely upon our knowledge of what we call "laws of nature," and on the endeavour to make our actions conform to them. But the task is laid upon us of finding out, by use of the faculties with which we have been endowed, what these laws are.

There is obviously in the universe some mysterious power at work compared with which all human effort is puny in the extreme. This

is a simple statement of fact the truth of which no reasonable man can deny. The really important question is as to the nature of this power —is it personal or impersonal?—a *something* or a *somebody?* And here it must be pointed out that merely giving names to things which we do not understand does not in the least degree explain to us what they are. Thus we may speak of Life-force, or *élan vital,* cosmic energy, etc., and the reader will probably have met with such expressions. But, apart from the convenience of having given names to vague concepts, no real increase of knowledge is gained by their use; they are still only more or less convenient symbols for unknown quantities—like the x and y of ordinary algebra. "Labelled ignorance is still ignorance" (Hardwick).

There is also another illusion, against which we must be on our guard, arising from our usual way of looking at things. When we perform certain actions, under prescribed conditions, we obtain definite results, and the experience of an invariable sequence enables us to act in full confidence that results will always follow the appropriate action. Hence we say that our actions *produce* these results. The language of everyday life thus lends support to this fallacy, but we must endeavour to be more precise. For example, a young child, seeing that by the act of moving a switch a dark room becomes filled with light, may imagine that his act produces the light. But suppose the switch when turned fails

to produce any illumination. If an electrician be called in to remedy the defect, then the child perceives that his own action is not the only factor to be considered. Or, if possible, take the child to the distant generating station to view the powerful machines which are at work producing electricity and the larger switches which control the current supplied to a whole district. The child will then be much more impressed with the insignificant part played by himself, notwithstanding the fact that his little effort is essential to the production of the result. This illustration may serve to exemplify our control over nature. Our actions are of the nature of "trigger" actions, or like the simple switching "on" or "off" of an electric current. In fine, we have a mysterious power of distributing energy and directing it into certain channels, but we neither produce the energy nor make the channels along which it flows. Without an external source of energy, over which we have no other control than what has been already indicated, the results of our actions would be as ineffectual as when a child turns on a switch in a circuit from which the current has been cut off.

We have spoken of this power as "mysterious," and so it is. For human action implies, more or less, the conscious exercise of will-power. The reader will at once perceive that we here come back again to the fundamental difficulty of the nature of the nexus between what we call "material" and "spiritual" or—to use terms

now commonly employed—the "physical" and the "psychical." Yet, taking words in their ordinary sense, we cannot conceive of an act of the human will as being anything but spiritual, and hence we have to recognize in the common experiences of everyday life this interaction between the spiritual and the material worlds.

Again, a very great part of human activity is employed in the manufacture of articles in daily use. We must now consider strictly what we mean when we say that we *make* things. In a large manufacturing industry, say of motor-cars, it is not infrequently the case that the manufacture of their various parts is conducted at separate places, and these parts are then brought to a single centre to be assembled and fitted together. Now, if we analyze this activity further, we must acknowledge that we only "make" anything in the sense that we select and assemble together materials already in existence. Thus all our manufacturing processes are reduced to this process of the selection and assemblage of parts —i.e., *moving things about*—even though these parts may be of very minute dimensions, and ultimately atoms or electrons which the chemist may be trying to bring into new combinations.

From a theistic standpoint, laws of nature are the human interpretation of the way in which it has pleased God to order the happenings of the material universe. When the astronomer Kepler, after years of patient study, discovered the laws of planetary motion, which prior to his time were

unformulated, he is said to have exclaimed, with ecstatic joy: "O God, I think Thy thoughts after Thee."

The exact meaning of a word or phrase is more frequently determined by usage than by etymology. The inadequacy of language to express thought with strict accuracy is often forced upon our consideration. It is frequently necessary to use the same word in different senses, and hence there is a constant danger of illegitimate associations becoming attached to a phrase from the fact that it contains a word used in more than one connection. "Laws of nature" is an expression so firmly established in scientific literature that it cannot now be dispensed with, but its exact significance requires very careful consideration. Briefly, the expression denotes the mode of occurrence of certain events or the concomitant appearance of certain phenomena.

We must first observe that the meaning of the word *law* when used in a scientific sense differs from that which is associated with it in civil life. A judge in court may preface his decision by saying, "As the law now stands," indicating thereby a possible modification of it at some future time. But it is a fundamental axiom of science that laws of nature are unalterable—they never change. Thus, for example, a chemical action which takes place to-day under given circumstances would take place at any other time and in any other place without change, provided the circumstances upon which the action

depends are not modified. This may be expressed as follows: "When the antecedent influencing circumstances are identical, then the same consequent event or reaction will invariably follow." In some cases, however, it is more correct to leave out the idea of sequence and replace it by that of concomitant occurrence. Thus, with a given mass of gas maintained at a constant temperature a definite volume is always associated with a definite pressure. If we want to obtain a definite pressure we alter the volume accordingly; or if we wish for a certain volume we modify the pressure. But it would not be strictly correct to speak of the pressure as being the cause of the volume or conversely.

Moreover, though such expressions may appear in scientific books, we must not use such phrases as "obeying the usual law," or "governed by the law," with any idea that "laws of nature" *control* the occurrence of events. They merely *describe* their mode of occurrence. Laws cannot govern, it is always the executive power behind the law which is the controlling element. Hence, to avoid error, we must beware of employing arguments based upon the etymology of the words or phrases used rather than upon the fact which they are intended to express.

Again, the assertion of the invariability of natural laws is the statement of a general principle the truth of which is *assumed*. It is admitted by all scientists that the assumption is a reasonable one, since it is based upon very

wide and uniform experience, but it must not be forgotten that arguments resting upon the truth of this general principle ultimately depend for their validity upon the truth of the initial assumption which has been made.

From a Christian point of view this invariability of natural laws is a consequence of the unchangeableness of God. He is all-wise, therefore there is no reason for any change of mind. We should be landed in chaos and utter confusion of thought if sometimes one consequence ensued and at other times, under identical circumstances, a result totally different. All science would then be impossible, we should be living in a world of chance. And again, however firm the faith of a scientist may be in the principle of the invariability of natural law, this does not confer infallibility upon the formulated statement of any law relating to a particular class of phenomena. The discovery of a law of nature is an inference from a large number of individual occurrences. In stating such a law it is assumed that the limited experience upon which it is based has been sufficiently representative to warrant a formula which will apply universally to the class of phenomena to which it relates. Hence all our assertions as to the invariability of a law of nature, thus formulated, are in fact subject to the qualification, expressed or implied, *As far as we know at present.* Our statement of such laws may not be entirely correct, either through defective knowledge or from imperfect

observation. It may be that some slight detail which influences the result has been overlooked; or the greater delicacy of new measuring instruments may bring to light minute differences which at an earlier period escaped observation. Absolute knowledge lies beyond our ken.[1] Hence with the growth of scientific knowledge we frequently have to amend the statement of a law of which the enunciation has been deduced from an experience too limited in its range to exhibit the true relationship of the observed phenomena. We may take, as an example, Boyle's Law, a very useful relation between the volume and the pressure of a constant mass of gas when kept at a definite temperature. But this law is only approximately true; the real relationship is much more complex and has not yet been correctly formulated, though—as in Van der Waal's equation—a much closer approximation to the truth has been made.

Again, though Newton's law of gravitation was formulated more than two centuries ago, and is sufficiently accurate for all the purposes of everyday life, yet Newton clearly perceived the philosophical difficulties involved in the conception of such a law.[2] It is now generally recognized that Einstein's view is a closer approach to the

[1] The relation between our apprehension of truth and the truth itself may be likened to that of a curve and its asymptote, a continual approach without ever attaining coincidence.

[2] Merz, *History of European Thought in the Nineteenth Century*, vol. ii. See footnote on p. 15.

truth. We must remember that the aim of science is to find out, to the highest degree of accuracy which is possible, the scheme or plan on which the universe is constructed and how its development proceeds, but we are not justified in attributing finality to any of our formulated statements made concerning such a plan.

We are also liable to error if we assume that, because what we call a "law of nature" is involved in the happening of any event, that law alone suffices to describe the mode of its occurrence. More frequently, and possibly in all cases, the consideration of more than one such law is requisite in order to account for its occurrence. We have to consider the actual event as the resultant of several influences rather than as due to any one of them, and of the nature of some of these influences we may be altogether ignorant. Our contemplation of a natural event is usually an effort of mental abstraction by which we focus attention on some salient points to the exclusion of others which we regard as relatively unimportant.

Laws of Nature in Relation to Human Freedom.

Our freedom, though limited, is real. We cannot leave out of consideration the spiritual element in our dealings with material things. We know, by conscious daily experience, that spirit does *in some way* act upon and through

matter. *How* it acts is quite another thing, and that we do not know. For example, suppose that a book is lying near the edge of my writing-table. I may inadvertently push it off the table and it falls to the ground. I may then decide to pick it up and restore it to its former position. But in so doing I have not, in any real sense, "interfered" with the law of gravitation—it is utterly out of my power to do anything of the kind. I have merely brought into operation another power, muscular effort, over which I have direct control, and combined its action with that of a natural agency. Gravitation has acted continuously all the time, manifesting itself at one time by pressure between the book and the table and at another time by the amount of muscular effort required to lift the book. So we move through life, not in the iron grip of mechanical necessity, but free to bring into operation, with ever-increasing fullness as our knowledge advances, sources of energy in the material universe and make them serve our purposes. We possess a certain degree of initiation, and though we cannot alter a law of nature in any way, yet we can determine, in a limited measure, the manner in which the law shall operate.

Divine Sovereignty.

And, on a scale far more vast and utterly beyond our comprehension, the Divine Being, to whom we must also attribute the power of

initiation—unless we regard Him as lacking that which we ourselves possess—can act directly on the material universe, or on the minds of men and other spiritual beings. Some people are inclined to think that insistence upon the invariability of natural law is inimical to religious faith.[1] They would rather conceive of God as a Being who can and does act fitfully, spasmodically, capriciously. Surely this is a wrong idea of Divine Sovereignty. If we look upon the laws of nature, as a theist perforce must, as a revelation of the way in which God *elects* to act, the difficulty seems to me to vanish. This analysis cannot be here further prolonged,[2] but we may assert in conclusion that Self-limitation in whatever manner it may operate, is not a restriction of Divine Sovereignty but is a mode of its manifestation and is essential to its existence.

[1] Such people are not quite consistent when, in public worship, they sing the words :

> Laws which *never* shall be broken
> For their guidance He hath made.

[2] For a much more adequate treatment of the subject of this chapter, see *Religion and Natural Law*. By C. F. Russell, M.A. (Hulsean Lectures, 1922-23.)

CHAPTER VIII

THE PLACE OF THEORY IN SCIENCE

The Origin, Nature, and Development of Scientific Theories.

Many people have a vague idea that a statement which is true can always be demonstrated, and ought in some way to be made evident by a formal proof before assent to it can reasonably be required. That is not the case. Just as it is impossible to draw a line without selecting some point as a starting-point, so assumption of some kind is a necessary preliminary to every process of reasoning. Let us ask ourselves what we really mean when we speak of "proving" a proposition in geometry. All that we actually do is to show its necessary connection with, and dependence upon, some other simpler proposition or propositions. All our knowledge of geometry is based upon a few simple statements the truth of which we have taken for granted and of which formal proof is impossible. These are our axioms or, as they were at one time called, common notions. When these axioms have been clearly stated their truth or reasonableness appears to us self-evident. Thus, for example, we find no difficulty in believing that "things which are

equal to the same thing are equal to one another." If we were challenged to give a proof of such a statement we should be at a loss how to set about it. In fact, we should regard the demand as unreasonable and as a reflection upon the intelligence of the person who made it. Thus most of our knowledge is based upon belief—faith in the trustworthiness of our perceptions and intuitions, *i.e.*, of our power to perceive truth. For truths that are fundamental—the foundation stones of knowledge—are *perceived*, not *proved*.

Faith is not a weaker kind of knowledge, a sort of crutch to lean upon when our footing is not secure. It is the exercise of a higher faculty than the intellect, though it necessarily acts in conjunction with it. Nor is the employment of this faculty absent from scientific work of the highest kind. "The vocation of the true experimentalist may be defined as the continued exercise of spiritual insight, and its incessant correction and realization. His experiments constitute a body, of which his purified intuitions are, as it were, the soul." (Tyndall, *Scientific Limit of the Imagination*, p. 54.) Thus the scientist also walks by faith, and his faith is confirmed or corrected by experience. There must be knowledge of some kind before faith can exist, but knowledge only grows in an atmosphere of faith.[1]

[1] Faith, in the religious use of the term, involves much more than mere intellectual belief in the truth of

In the last chapter we considered the meaning of the expression "laws of nature." We must now deal with the kindred subject of theories in Natural Science. As it is on its theoretical side that controversies arise as to the relations of Science to Philosophy and Religion, this topic requires very careful attention. What is a theory? Should scientific theories be included in Natural Science as forming a part of it? What is the relation of theory to "laws of nature"?

The first point to notice is that in the usual signification of the word *theory* the idea of probability is definitely involved. A scientific theory is a statement relating to natural phenomena which is *assumed to be true,* but which is not as yet certified by sufficient evidence to entitle it to be regarded as an established fact.[2] The term may be applied to statements which are held with very varying degrees of assurance as to their correspondence with reality. A

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a proposition. In addition to the assent of the mind, it includes trust, an emotional impulse, also volition, a consent of the will leading to action. (A short but very instructive paper on "The Psychology of Faith," by R. H. Thouless, M.A., will be found in *Psyche,* January, 1923. Kegan Paul and Co.)

[2] The definition, as here given, may be objected to. Etymologically the word "theory" means "a view of things" without regard to its correctness or incorrectness. But popularly, as in the phrase "a mere theory," the idea of uncertainty is mentally attached to the word, and, for the purpose of argument, it is desirable to recognize this aspect.

statement may be a mere surmise without any appreciable evidence in its favour ; or adopted as "a working hypothesis" in cases where there is sufficient evidence to warrant careful examination ; or, again, regarded as an "accepted theory" when the evidence for it is greater than for any other hypothesis relating to the same subject-matter. Finally—unless in the course of investigation the theory has been disproved and therefore discarded—we may reach the stage when evidence has been obtained which compels belief and the theory becomes an established fact. Thus the proof of a theory involves its destruction, for in popular thought "fact" and "theory" are opposed terms. More correctly, having regard to the strict etymology of the word, the proof of a theory transmutes it into a fact.

Hence it will be evident that, notwithstanding the close connection of theory with science, scientific theories, as such, are not science in the strict sense of that term.[1] It will, I think, help us here if we make use of Tyndall's optical analogy and conceive of an intermediate penumbral region of thought lying between the fully illuminated area of exact knowledge and passing gradually through stages of lower illumination into the darkness of the unknown. A scientific theory covers a portion of our actual knowledge, but extends beyond it. As

[1] Certainly not so if science is held to be merely "descriptive."

a first condition, a theory must not be in conflict with facts already known and must bring them into rational relationship with one another. But its consequences and implications generally lead beyond these facts and indicate new fields to be explored. Hence a second test of its truth, and one of a very searching character, is the predictive power of a theory.[1] When these predictions are verified by experiment the area of knowledge is extended and the truth of the theory correspondingly confirmed, though not necessarily fully established. Science grows to a very large extent by this process of the formation of theories and their confirmation or disproof. In passing, it may be observed that disproof is often as serviceable as proof, for a part of scientific investigation is the task of definitely finding out what is *not* true.

If we examine the relation of theory to "laws of nature," we find ourselves again up against the problem of exact delimitation, because it is not always possible to distinguish between the statement of a theory and the statement of a law (*e.g.*, gravitation). But a law is a deduction from observed phenomena and answers the

[1] Thus, in 1871, Mendeléeff predicted the existence of three new elements which were required to fill up gaps in his table expressing the Periodic Law. Furthermore, he deduced the density of these yet unknown metals and described the character of some of their compounds with other elements. These predictions were verified within twenty years. (See *The Principles of Chemistry*, by D. Mendeléeff, vol ii., p. 25.)

question *how* such phenomena occur; whereas a theory is an attempt to answer the question *why* events happen in a certain way. Thus, if we ask in what way, or according to what rule, the planets of our system move round the sun, Kepler's laws of planetary motion (into which the idea of gravitation does not enter) give a sufficient answer. But Newton's theory of gravitation goes further and supplies the reason, since Kepler's laws follow from the theory as a necessary consequence. Thus a theory is a step towards interpretation, and its aim is philosophical. It is an effort to get nearer to the heart of things, and to unify a certain portion of our experience by bringing it under a general principle and so to connect "description" with "interpretation." Some scientific theories have a very limited scope, as, for instance, the relative positions of the atoms in any particular molecule. But a comprehensive theory, such as the Wave Theory of Light, bears much the same relation to "laws of nature" as each one of these laws bears to a special group of phenomena.

As we have seen, a theory passes beyond the range of actual knowledge and is of the nature of a guess at a more comprehensive truth. But such a guess is by no means made at random. It is based upon a wide knowledge of facts, and generally preceded by a long process of thought and investigation. The most important theories in Natural Science are due to the imaginative efforts of men of genius who perceive, by a

kind of intuition,[1] some hitherto unsuspected relationship between phenomena leading to the statement of a general principle of great comprehensiveness. It is not usually the case that such a theory emerges into view in a complete form. As first conceived, the theory usually suggests new lines of investigation, which may lead to the discovery of facts necessitating a modification of the original statement. The development of a theory may be likened to that of a living organism, growing to maturity in a suitable environment and changing its form in the process. "The profoundest minds know best that Nature's ways are not at all times their ways, and that the brightest flashes in the world of thought are incomplete until they have been proved to have their counterparts in the world of fact" (Tyndall). The extent of this change in the form of a theory may be very considerable, though still leaving intact what may be called the central or germinal idea. Thus Dalton's atomic theory has been so much modified by the modern conception of atomic structure that the use of the word *atom,* in its strict etymological sense and as applicable to the smallest quantity of any chemical element which can exist, has no longer any justification as the statement of a fact in nature, though it is retained for the sake of convenience and historical continuity. Yet

[1] Henri Poincaré, *Science and Method.* Chap. iii., on "Mathematical Discovery," is a chapter of great interest from a psychological point of view.

the central idea of the original theory that small and definite quantities of matter can be transferred as a whole from one chemical compound to another has not been invalidated by our subsequently increased knowledge of atomic constitution and behaviour. The idea of indivisibility and unchangeableness in the composition of an atom has, however, completely passed away. Atoms are subject, like other material things, to the law of change, and in this respect they are no longer regarded as forming a unique class.

A man of science will never say that he *knows* a theory to be true. He may say that he believes it to be so, or, more probably, that it is the nearest approximation to the truth to which he has at present attained. Possibly he will be able to point out some defects in the theory which compel him to regard it as only provisional. The grounds for his belief in it are that he is thus enabled to co-ordinate a very large number of facts in a consistent scheme. He may be able to add that, carrying out his investigations on the assumption that the adopted theory is true, he has been led to the discovery of new facts which, unaided by the theory, he would not have been likely to ascertain.[1] It is often the utility of a theory as an aid to research which appeals to the scientist more strongly than the probability of its truth.

[1] The student of optics may be reminded of the Wave Theory of Light and the mathematical anticipation of the discovery of conical refraction.

In the light of what has been already stated in this necessarily brief sketch, we pass on to the consideration of some of those theories which have agitated, or still agitate, the minds of men. No intelligent man can be indifferent to the nature of the world in which he lives or of his own nature as a human being.

The truth of some theories is capable of exact demonstration. Hence the theory of one age may become a fact of common knowledge at a later time. Centuries ago the idea that the form of the earth was globular was a mere surmise—and regarded as a very foolish idea. But the problem was open to investigation, and, with increase of knowledge, especially when the world had been circumnavigated, it was perforce recognized as an undeniable fact. Similarly, at a later period, the theory of Copernicus that the earth was not a stationary body, but revolved with other planets round the sun, became so well established by astronomical evidence that it could no longer be reasonably disputed and has now become a part of common knowledge. But this is not the case with every theory. Some theories, like that of Evolution, are not capable of exact demonstration but are accepted because of the amount of cumulative evidence in their favour. Taking a map of England, let us suppose that a circular patch has been cut out of it representing an area of ten miles' radius and including London. Anyone looking carefully at the mutilated map would have no hesitation in affirm-

ing, from the convergence of roads leading from every direction, that a large city must exist in that portion of the country represented on the part of the map which has been cut away, though he would not be able to describe its exact position nor the contour of its boundaries. That is much the position in which we stand to-day with regard to the theory of Evolution. This raises the question, Can a theory so important in its bearing on the interpretation and conduct of human life be rightly ignored because it is incapable of exact demonstration? Many educated men appear to take an attitude in reference to the theory of Evolution which they would recognize as impracticable for universal adoption. When we use the aphorism that "Probability is the guide of life," we recognize the fact that in the vast majority of cases our actions are based upon belief rather than upon actual knowledge. For, from an intellectual point of view, *all* our beliefs and our intuitions lie in the penumbral region of thought and cannot lie elsewhere. Those conceptions which relate to matters in the region of exact knowledge do not involve faith except as regards the fundamental assumptions which form the basis of that knowledge. For conceptions which lie outside these limits we seek for evidence sufficient to justify belief. There are some theories which, though not within the region of pure science, yet so closely approach its border that we are compelled to take account of them in everyday life. And one who regards Nature

as forming a part of Divine Revelation will be eager to form right views about it, and will welcome the light which Science throws upon its interpretation. Nor will it perturb his mind to learn that notwithstanding his high position and still higher destiny, man had, as a part of the Divine plan, a very lowly origin.

CHAPTER IX

RELIGIOUS DIFFICULTIES

"THINGS HARD TO BE UNDERSTOOD." A SCIENTIFIC PARABLE.

WHATEVER criticisms may rightly be passed on a formulated statement of religious belief, to reject it as untrue or untrustworthy *merely* on the ground that it leads to difficulties of an intellectual kind is not an attitude which can be taken by any reasonable man. In what branch of science do we not eventually come to "things hard to be understood"? The more comprehensive the scope of the science, the greater are the difficulties met with in its investigation. In fact, if we could conceive of a system of religious doctrine free from intellectual difficulty of any kind, it might, on that account alone, be dismissed as inadequate or untrue, since it would be so utterly at variance with our experience in any other region of thought.

Difficulties may be due to the transcendental character of the subject-matter. But sometimes difficulties are artificially produced by an impatient attempt to provide a premature and arbitrary solution of some apparently insoluble problem. Such solutions often become invested with an authority to which they have no rightful

claim. These erroneous methods are a prolific source of perplexity. That the whole is greater than its part is a very familiar mathematical axiom. But one of the commonest sources of error in dealing with great subjects is, consciously or unconsciously, to treat a part as equivalent to the whole. It may be that the part so taken *is* the whole which is perceived at the time; or that a disproportionate emphasis has been laid upon one part of perceived truth, causing an equally important part to be obscured. Great truths, which we are only capable of partially comprehending, have often to be expressed by statements which are seemingly contradictory but really complementary. To see the truth in two different directions is often very difficult. We look eastward and see along a line of truth for a little distance; we turn our faces westward and in that direction also perceive truth to a limited extent. But our point of view is not sufficiently elevated nor our power of vision equal to the task of seeing the greater arc which unites the two opposite portions in a complete circle. Thus, for example, we must think of the Divine Being as both Immanent in nature and yet Transcendent. If we lose sight of either truth we fall into the errors of Pantheism or Deism. The realisation of Divine Immanence carries with it a vivid consciousness of nearness:

> Closer is He than breathing, and nearer than hands and feet.
>
> TENNYSON: *The Higher Pantheism.*

Yet, on the other hand, the thought of Divine Transcendence gives the idea of a God of majesty far removed from daily life. But, down through all the centuries, both impressions—*far away, yet near*—are true to religious experience. Some passages in the Old Testament express an overwhelming sense of Divine Omnipresence (Psalm cxxxix.) ; while others betoken a poignant and almost despairing sense of God's remoteness.

> Behold, I go forward, but he is not there; and backward, but I cannot perceive him : on the left hand, where he doth work, but I cannot behold him : he hideth himself on the right hand, that I cannot see him. (Job xxiii. 8, 9.)

This is a general characteristic of religious experience, not confined to one race or to one form of religion.

One of the classics of Christian literature is a book written by Bishop Butler nearly two centuries ago, entitled "*The Analogy of Religion,* Natural and Revealed, to the Constitution and Course of Nature." "There is," the author asserts in one of his sermons, "a much more exact correspondence between the natural and the moral world, than we are apt to take notice of."

The kind of argument employed by Bishop Butler in his great work is indicated by the following passage :

> Although the argument from Analogy be allowed to be imperfect and by no means sufficient to solve

all difficulties respecting the government of God, and the designs of His providence with regard to mankind, yet surely it is important to learn from it that the natural and moral world are intimately connected and parts of one stupendous whole or system. If both may be traced to the same general laws, and appear to be carried on according to the same plan of administration: the presumption is that both proceed from one and the same Author.

Then we may argue, from this principle of analogy, that if the revelation of God in Nature has a real correspondence with any higher form of revelation, we may expect to find "things hard to be understood" in one as well as in the other. We may indeed go further, for there ought to be some analogy in the way in which such difficulties should be met. Hence the way, if there be a way, of meeting any great difficulty in Natural Science may be a guide to us as to the manner in which to deal with difficulties of a religious character.

A Scientific Parable.

It is instructive to observe how a pioneer in scientific research feels his way when confronted with a difficult problem lying on the borderland of the unknown. I have before me the report of a lecture, delivered in Oxford in May, 1921, on Electrons and Ether Waves,[1] by one of the fore-

[1] *Electrons and Ether Waves.* By Sir W. H. Bragg. (Robert Boyle Lecture, 1921.)

most men in the ranks of modern science. I am about to take from it a few sentences for the purpose of showing that in other than religious matters we come across things which are puzzling and apparently contradictory and irreconcilable. And, reading between the lines, we should observe the spirit in which such difficulties are faced. New facts in Natural Science are constantly being discovered, and any complete theory must find a place for them all. Now one of the greatest puzzles in modern science is to explain adequately the nature of radiation; so this will be a good example to take for the purpose of illustrating out point.[1]

The reader is doubtless acquainted with Newton's corpuscular theory of light. That theory satisfactorily accounted for the facts known at the time. At a later period the existence of an ether was assumed, and the wave theory of light was promulgated. This rival theory accounted for all the facts which Newton's theory explained, in addition to other phenomena which that theory failed to account for. It therefore rightly displaced the older theory. The wave theory has done great service for more than a century in co-ordinating phenomena, and

[1] The apt illustration supplied by this lecture has been employed by more than one writer. The author must not, however, be accused of plagiarism, as he used the illustration in an address to students on November 29th, 1921, of which this chapter contains the substance.

it has led to new and important discoveries. Now again, in our time, new facts about radiation have been discovered which the wave theory does not satisfactorily account for, but, strangely enough, they seem to require a theory resembling the emission theory as put forward by Newton. The lecturer points out: "It is just this that makes the greatest puzzle in modern physics. It is the block at one point choking the entire traffic, and on which, therefore, all our efforts must be concentrated." Note particularly how a leader in science treats such a difficulty. In the first place, puzzling as it is, it does not disconcert him. It contains an indication of further truth to be discovered in a region not yet fully explored. I again quote a few instructive sentences.

> No known theory can be distorted so as to provide even an approximate solution. There must be some facts of which we are entirely ignorant and whose discovery may revolutionize our views of the relations between waves and ether and matter. For the present we have to work on both theories. . . . That is, after all, a very proper attitude to take. We cannot state the whole truth since we have only partial statements, each covering one portion of the field. When we want to work in any one portion of the field or other, we must take out the right map. Some day we shall piece all the maps together.
>
> Meanwhile, even if we cannot explain the phenomena we must accept their existence and take account of them in our investigations.

That is the moral of this brief sketch—TAKE OUT THE RIGHT MAP. Now this language is, to my mind, very instructive. First notice that the observer does not lose faith in the unity of Nature. He still clings to the belief that there is a view—though he is as yet unable to formulate it—which will satisfactorily correlate all the phenomena with which he has to deal. Nor does he lose faith in the achievements of the past, but he recognizes more clearly than before their incompleteness. Neither of the two theories alluded to does he regard as altogether false. Something, as yet undiscovered, is necessary to link them together. We must, he again tells us at the end of his lecture, concentrate all our efforts on finding out what that something is which blocks the way. "Some day we shall piece all the maps together." There you have exhibited the faith and hope of a scientific man. He believes that all the phenomena which he has before him form part of one great scheme which he has but imperfectly recognized. From one standpoint he has mapped out a part of it; from another standpoint something more. But he is compelled to regard both his little maps as fragments of a larger whole, each containing truth—neither of them, nor indeed both of them put together, containing the whole truth. If Bishop Butler were writing to-day, he would certainly find here a most useful lesson for us in dealing with difficulties in higher matters than those of

which physical science treats. Take this, then, as a parable to show you how to regard new truths which seem to disturb old landmarks.

We have already alluded to the fact that many difficulties are artificially created. Many of the books written during the past century in the vain attempt to reconcile the scientific knowledge of the day with a literal interpretation of portions of the Bible may be cited as examples of this fact. Such forced interpretations may be likened to the process of taking two incomplete maps and, by some pruning of their edges, fitting them together into one. And an imperfect theology—for no one would surely pretend that human knowledge of God is perfect—and a still very incomplete Natural Science cannot be dovetailed into each other at every point. We must be prepared for some divergence of view and for some difference of emphasis when Nature is regarded from a scientific or from a strictly theological standpoint.

Have not many of our difficulties, past and present, arisen from the fact that in the region of religious thought we frequently make the mistake of not taking out the right map? We are using the wrong map if we persist in interpreting Nature, or human history, by taking as literally true every passage in the Bible relating to these subjects and excluding all other evidence. Again, we are using the wrong map if we imagine that any knowledge of Natural Science—however

extended—will give us adequate guidance in dealing with the deeper problems of life. Nor again are we acting in a philosophic spirit if we insist that one map only has any title to our regard, and that the other may be set aside as valueless. For this is what we do when we ignore either the psychical or the physical aspect of our experience.

Truth needs our intelligent recognition, but not our feeble and futile attempts at "reconciliation." The different parts of truth will automatically find their proper places as our survey gains in completeness, and any forced accommodations do but increase our difficulties. What is requisite is loyalty to truth wherever we find it.

I again refer to our scientific guide. "Meanwhile, even if we cannot explain the phenomena we must accept their existence and take account of them in our investigations." In religion, as in science, we are sometimes confronted with new discoveries which conflict with views accepted as true before these facts were known. At the present time we have to recognize many facts of which our forefathers were unaware, and we must take account of them in our theology. A living theology is necessarily a growing theology, and must therefore be capable of changing its forms of expression to incorporate new knowledge. A "static" theology may not be dead but is decadent—certainly not "increasing in the knowledge of God." Apparently there is a long struggle yet to come. But, recognizing

that "All knowledge is knowledge of God,"[1] we must patiently endeavour to "follow the gleam," confident that we are thus being led to a fuller realisation of the truth. "He that believeth shall not make haste."

[1] A statement which, I believe, occurs somewhere in Bishop Gore's writings. E. H.

CHAPTER X

NATURE A DIVINE REVELATION

These are Thy glorious works, Parent of Good!
Almighty! Thine this universal frame,
Thus wondrous fair; Thyself how wondrous then!
Unspeakable! Who sitt'st above these heavens,
To us invisible, or dimly seen
In these Thy lowest works; yet these declare
Thy goodness beyond thought, and power divine.

MILTON: *Paradise Lost,* book v.

NATURE is a term of much vaster import than Natural Science. "Trying to make science contain nature is like trying to make the part contain the whole" (Henri Poincaré).[1] To see life clearly and to see it whole we must gain emancipation from the thraldom to which a purely scientific view of Nature would subject us. The mechanistic view of Nature requires as a correlative something more humanistic. To recall to mind one of the definitions already given, Science is concerned with "measurable aspects of fractions of reality." The beauties of Nature, the feelings of awe and wonder aroused by the vision of the cosmos, lie outside its domain. But the poet and the artist are as

[1] *Science and Method,* translated by Francis Maitland, p. 16.

directly concerned with Nature as the scientist, and are even more strongly convinced that in their outlook upon the universe they are in touch with reality.

Bacon, Newton, and other great discoverers in science unite in telling us that to the study of Nature we must bring the heart of a child if we would read its lessons aright.

> In any true searcher of Nature there is a kind of religious reverence; for he finds it impossible to imagine that he is the first to have thought out the exceedingly delicate threads that connect his perceptions. The aspect of knowledge which has not yet been laid bare gives the investigator a feeling akin to that experienced by a child who seeks to grasp the masterly way in which elders manipulate things. (*Einstein the Searcher,* p. 46. By Alexander Moszkowski.)

Natural Science is "neutral" with regard to religion, since its province is limited to one aspect of Nature. It may suggest questions about the deeper problems with which religion has to deal, but it is not competent fully to answer them. Yet if Natural Science is silent on these points, Nature is, and in all ages has been, vocal to the spirit of man. It appeals to the educated mind and sensitive soul of a Wordsworth, and, perhaps even more powerfully, to the mind of the untutored savage who feels oppressed by its mystery and regards many of its happenings with superstitious fear, haunted by a sense of the presence of invisible agents at work behind all visible

phenomena. Nature-worship, in various forms, has been the earliest mode in which the religious instinct in man has found expression. There exists in every human being some capacity for a kind of mystic communion with the natural world. It is akin to that sentiment which we denote by *joie de vivre,* a token of physical well-being and mental harmony which is most manifest in early life. Yet to older people, burdened with care and sore of heart, there comes at times

> That blessed mood,
> In which the burthen of the mystery,
> In which the heavy and the weary weight
> Of all the unintelligible world,
> Is lightened.
>
> (Wordsworth.)

There is a tendency, at least in popular thought, to regard Natural Religion as a kind of back number in Theology, suited to the needs of mankind in early ages, but no longer needing serious consideration by the possessors of a Bible or by the adherents of a Church. Nature thus becomes looked upon as a field whose secrets the man of science may seek to discover ; where the artist may find scope for his descriptive talent ; or about which the poet may exercise his gifts of imagination ; but with which devout souls are not much concerned. This view finds no support in the highest forms of religious literature. Nature has its lessons for every generation and provides fitting symbols for the expression of religious emotion. The Psalms are full of references to

Nature's ways, and what sublime descriptive passages are to be found in the Book of Job! And if we read through the Gospels, noting only the references to natural phenomena, we shall see that Nature poets of every age and race may claim to have received their commission, as religious teachers, from the founder of Christianity. The injunction, "Consider the lilies of the field," must be read in the light of a permanent instruction to the Christian Church. The Apostle Paul distinctly recognizes that in Nature, and especially in human nature, man has received a real revelation of the Divine. In his discourses at Lystra (Acts xiv. 17) and at Athens (Acts xvii. 28) these features are stressed. Again, in the Epistle to the Romans, he puts as the foundation of one of his principal arguments the assertion that "the invisible things of him from the creation of the world are clearly seen, being understood by the things that are made, even his eternal power and Godhead" (Rom. i. 20). We must therefore make our conception of revelation extensive enough to embrace every form in which it has been, and still is being, given. Divine Immanence is a phrase of relatively recent introduction into theological literature, but the fact which it expresses is an eternal truth. It is not merely an idea to be pigeonholed in the mind, but must be assimilated in thought, until it becomes a part of our mental equipment.

What did prehistoric men think about? Much

certainly about food, the means of obtaining shelter and the necessity of self-protection. But their thoughts were sometimes forced to go beyond the sordid cares of mere animal existence. Let us go back in thought to the early history of the human race, to the very beginning of religious experience.

Physical Religion. (Max Müller.)

What right have we to find fault with the manner in which the Divine reveals itself, first to the eye, and then to the mind of man? Is the revelation in nature really so contemptible a thing that we can afford to despise it, or at the utmost treat it as good enough for the heathen world? Our eyes must have grown very dim, our minds very dull, if we can no longer perceive how the heavens declare the glory of God. We have now named and classified the whole of nature, and nothing seems able any longer to surprise, to terrify, to overwhelm us. But if the mind of man had to be roused for the first time, and to be lifted up to the conception of something beyond itself, what language could have been more powerful than that which spoke in mountains and torrents, in clouds and thunder-storms, in skies and dawns, in sun and moon, in day and night, in life and death? Was it possible to contemplate the movements of the heavenly bodies, the regular return of day and night, of spring and winter, of birth and death, without the deepest emotions? (p. 141.)

Can we imagine a more powerful revelation? Is it for us to say that for the children of men to join in praising and magnifying Him who had revealed Himself in His own way in all the magnificence,

the wisdom and order of nature, is mere paganism, polytheism, pantheism, and abominable idolatry? I have heard many blasphemies, I have heard none greater than this. (p. 142.)

It was in these very phenomena of nature, the sky, the sun, the fire, and the storm-wind which seems to us so natural, so ordinary, so hackneyed, that man perceived for the first time something that startled him out of his animal torpor, that made him ask, What is it? What does it all mean? Whence does it all come from?—that forced him, whether he liked it or not, to look behind the drama of nature for actors or agents, different from merely human agents, agents whom in his language and thought, he called superhuman, and, in the end, divine. (p. 335.)

We live in an age of rapid scientific discovery and of intensive specialization in scientific research. The prolonged concentration of mind involved in scientific work has an undoubted tendency—to which Darwin himself bears testimony—to produce atrophy of higher psychical faculties, and to make individual development become one-sided.

We are not living in an age like that which produced Sophocles and Socrates; nor in the age of St. Paul and Epictetus; nor in that of Shakespeare and Sidney. This is the age of chemistry and engineering and mathematics and everything that can be observed or counted or analysed or weighed; not the age of the idealist and the poet. But our age is not to be taken as the final goal; the exhibition of what the world is to be.

If you want to learn the greatest thoughts you

must read the poets—live with them; and if you wish to know precisely the point to which philosophy has reached to-day, you must read it in those poets who have anticipated or embodied the science of to-day—Tennyson and Browning. (J. M. Wilson, D.D., *Evolution and the Holy Scriptures*. 1903. S.P.C.K.)

"The poet and the prophet are near akin." But, in general, we English are a matter-of-fact, a two-and-two-make-four kind of people. We are pragmatists rather than idealists, priding ourselves on our practical common sense. Quote poetry to "the man in the street" and the probability is that he will look askance at you, wondering in his own mind whether you are quite "all there." Lacking, as most of us are, in what Disraeli called "Eastern sunlight in the blood," poetry is, to many people, a decorative rather than a structural element in life—confectionery, if you like, but not substantial food. Hence, unless we can drill our minds by study and bring our spirits into sympathy with older forms of thought, we are apt to read Oriental, ancient and poetic writings, in an Occidental, modern and prosaic fashion, forgetting that these writers often clothed their thoughts, as they did their bodies, in picturesque garb.[1] Nor, as com-

[1] "More than half the blunders we make about our Bible come from sheer want of imagination to understand the language of sunnier climates than our own. We read our chapter soberly, and turn metaphors into literal facts." (Gwatkin, *The Knowledge of God,* third edition, vol. ii., p. 106.).

pared with Asiatic races, do we possess much of the contemplative spirit. Especially in the hurry and rush of modern life is serious thought likely to be crowded out. With regard to matters of religious belief we are in danger of neglecting the wise injunction to "think on these things," and to forget the psychological fact that what never enters into the mind of an individual is to him non-existent; whilst what is rarely thought of is on the road to become unreal.

There is a religious, as well as a scientific, use of the constructive power of the imagination, not as a fanciful picturing of what is not, but as a vivid realisation of what is. Here the poet may help our flagging thoughts to reach a higher level unless our minds are so sodden with the idea of the commonplace that, as with the Peter Bell of Wordsworth's poem, only the outside of things appeals to us:

> A primrose by the river's brim
> A yellow primrose was to him,
> And it was nothing more.

Our faculties are too limited to enable us to view Nature except under a dual aspect of physical phenomena and psychical impressions, however much we may suspect that there is an underlying unity which we fail to apprehend. In one of the Apocryphal books there is the somewhat cryptic statement, "All things are double one against another, and God hath made nothing imperfect." This doubleness impresses itself upon

all who think seriously. Man's nature is a double nature, linked to the material world, but having also a spiritual side. E. B. Browning writes :

> And in this twofold sphere the twofold man
> Holds firmly to the natural to reach
> The spiritual beyond it.
>
> (*Aurora Leigh.*)

Milton (*Paradise Lost*) puts the question :

> What if earth
> Be but the shadow of heaven and things therein
> Each to other like, more than on earth is thought?

What important aspect of Nature has not been hymned again and again by poets ancient and modern? Some would ridicule as exaggerated sentiment the lines of Wordsworth :

> To me the meanest flower that blows can give
> Thoughts that do often lie too deep for tears.

Certainly poets do sometimes employ exaggerated language. But Science is ever teaching the lesson that the key to knowledge lies in the hands of those who have the capacity to discern the significance of small things.

> Wisdom is ofttimes nearer when we stoop
> Than when we soar.

This recognition of the mystery of common things is well expressed by Tennyson :

> Flower in the crannied wall,
> I pluck you out of the crannies,

> I hold you here, root and all, in my hand,
> Little flower—but if I could understand
> What you are, root and all, and all in all,
> I should know what God and man is.

Is this only fine sentiment, merely poetic fancy? May it not be something more? May it not even be sound philosophy? To know a thing completely requires a knowledge of all its relationships. If, however, poetry is unconvincing, let us listen to the conversation of scientists as they discuss this topic.

We spoke of the "Properties of Things," and of the degree to which these properties could be investigated. As an extreme thought, the following question was proposed:

Supposing it were possible to discover *all* the properties of a *grain of sand,* would we then have gained a complete knowledge of the *whole universe?* Would there then remain no unsolved component of our comprehension of the universe?

Einstein declared that this question was to be answered with an unconditional affirmative. (*Einstein the Searcher,* p. 202.)

In relation to Science, "fractions of reality" is a phrase worth remembering. The main object of this chapter is to impress upon the mind of the reader that there are other, and yet more important, fractions of reality to be included in a full conception of what the word Nature signifies.

One very definite service which Science has rendered to religion is that it has so fully revealed the unity of all Nature that polytheism is now an

impossible creed for an intelligent man. This was not the case in ancient times. Yet the partial revelation which we have presented to us in Nature as to the existence of a beneficent Creator and providential Ruler of the universe is not of that cogent character which compels conviction. For Nature presents to us many problems which baffle our understanding. But the vastness of the cosmos, the variety and the beauty which we see so lavishly displayed, make more and more repugnant to a normal mind the idea of any "fortuitous concourse of atoms" as a satisfactory explanation of its origin or development. The further we are able to penetrate into the secrets of Nature, the stronger becomes the conviction that there is purpose in it; that its course is directed to the attainment of some great end. More particularly is this the case when an endeavour is made to realize the significance of the long course of the development of organic life upon the earth. A consistent theist must regard Nature as a revelation of the Divine and will welcome scientific investigation as an indispensable auxiliary to the interpretation of its meaning.

One of the most difficult tasks of our own age is to assimilate and incorporate into theology the new knowledge of Nature and of man which every kind of Science has made known to us during the past century. In almost every direction the horizon of thought has been extended. Our best theologians are now essaying a task which will take a long time to fulfil. And in this

endeavour it is of happy augury that so many of the leaders in Science at the present time are enforcing the truth that the scientific view of Nature is but a partial view which leads up to and requires the complement of a spiritual interpretation.

FOREST HYMN.[1]

The groves were God's first temples. Ere man learn'd
To hew the shaft, and lay the architrave,
And spread the roof above them,—ere he framed
The lofty vault, to gather and roll back
The sound of anthems; in the darkling wood,
Amidst the cool and silence, he knelt down,
And offered to the Mightiest solemn thanks
And supplication. For his simple heart
Might not resist the sacred influences
Which, from the stilly twilight of the place,
And from the gray old trunks that high in heaven
Mingled their mossy boughs, and from the sound
Of the invisible breath that sway'd at once
All their green tops, stole over him, and bow'd
His spirit with the thought of boundless power
And inaccessible majesty. Ah, why
Should we, in the world's riper years, neglect
God's ancient sanctuaries, and adore
Only among the crowd, and under roofs
That our frail hands have raised?

. . . . .

Father! Thy hand
Hath reared these venerable columns; Thou
Didst weave this verdant roof.

. . . . .

[1] From *Songs of God and Nature*. Edited by David Page, F.R.S.E., F.G.S. (Much abridged.)

Thou hast not left
Thyself without a witness, in these shades,
Of Thy perfections.—Grandeur, strength, and grace,
Are here to speak of Thee.

. . . . .

My heart is awed within me when I think
Of the great miracle that still goes on
In silence around me—the perpetual work
Of Thy creation, finished yet renew'd
For ever. Written on Thy works I read
The lesson of Thine own eternity.

. . . . .

Be it ours to meditate
In these calm shades Thy milder majesty,
And to the beautiful order of Thy works
Learn to conform the order of our lives!

(William Cullen Bryant.)

American.

BOOKS RECOMMENDED

The Spiritual Interpretation of Nature. Third edition. By J. Y. Simpson, D.Sc., F.R.S.E. (Hodder and Stoughton.)

The Evidence of Things Not Seen. (Part I.) By Professor J. Fleming. (S.P.C.K.)

The Spiritual Message of Modern English Poetry. By A. S. Hoyt. (S.C.M.)

CHAPTER XI

THE THEISTIC OUTLOOK ON NATURE

> Earth's crammed with Heaven
> And every common bush afire with God;
> But only he who sees, takes off his shoes.
> E. B. Browning.

In this chapter the truth of the first article of the Christian creed will be assumed. No attempt will here be made to marshal the evidence which justifies the position taken by the theist. There is no lack of apologetic literature available for the inquirer as to the grounds on which belief in God rests.[1] Our endeavour will be to consider how the outlook of a scientific man on nature is affected by a whole-hearted acceptance of this fundamental tenet. It is scarcely necessary to say that if its consequences and implications are at all adequately realized, no part of his view of nature and life can fail to be profoundly affected thereby. New problems will necessarily arise for consideration, some of which may be of the kind which we are compelled to regard as at present insoluble.

[1] See list of books recommended at the end of this chapter.

I BELIEVE *in one God, the Father Almighty, Maker of heaven and earth, and of all things visible and invisible.*

Day by day this affirmation is made by millions of human beings. What a tremendous assertion! How comprehensive its range!—even if considered merely in relation to "things visible"—*i.e.*, the physical universe. We therein confess that we are surrounded on every side by the works of a Divine Artist. Every atom, every electron, every quantum of energy and all the intricate relationships which link together the different parts of a cosmos, so vast that every attempt of man's feeble imagination to picture it is baffled, are affirmed to be *derivative*—the outcome of a Divine Mind and Will. But further, in the word *invisible,* we include all that is psychical in nature; all spiritual beings, of every kind and degree, wherever and however existing.

Let us now examine attentively the most important terms used in this statement of the Christian faith.

I Believe.

Obviously the above statement is not one coming within the range of scientific knowledge. When I say that *I believe,* I thereby confess that I do not *know,* using this word in its usual sense. If I were capable of such transcendent knowledge, the word *believe* would not be appropriate. But I emphatically affirm that the

statement meets with the full assent of my mind and heart and the consent of my will to the obligations it involves. Regarded *intellectually* it is the fundamental assumption which I make in my outlook on life and the universe.[1]

MAKER (*Meaning of Creation*).

What are we to understand by the word Maker? Does it seem a worthy idea of God to think of Him as a Creator having made the world in a dim and distant past and then left it to run on by itself? Let us take a homely illustration from the football field. Are we to conceive of the act of creation as though, at the beginning of the season, a distinguished patron of the game, and the author of a book of rules on the subject, condescended to give the first kick to the ball, but then retired from the field of play to act the part of a more or less interested spectator? Or are we to think of it as the act of the Captain playing the game throughout, inspiring and directing its course? Surely we think wrongly of God's relation to the universe if we conceive of it as consisting principally in one or more initial acts, with a few subsequent "interferences" which we call "miraculous." We are denizens of a universe in which God is ever at work. This was our Lord's view of

[1] I here again repeat the statement previously made that though faith involves assumption it is not merely, nor mainly, an intellectual act.

nature. "My Father worketh hitherto, and I work." To the mind of Jesus, God was ever present, ever active. He speaks of Divine action in the present tense, not as something God *did* but as something which He *does*—He clothes the grass, feeds the birds and sends the rain. If Christ's teaching is to be the foundation for our creed, then in the song of every bird, in the growth and beauty of every flower, we must recognize the ceaseless activity of the Creator. And, though it passes utterly beyond the range of our comprehension, we must also take into account the Divine consciousness of all that is and all that happens.

What meaning is to be attached to the word "created," as it occurs in the first verse of the Book of Genesis? No mere recourse to etymology will help us here, but, as regards the Hebrew word so translated, Canon Driver states: "It is doubtful whether it was felt to express definitely the idea of 'creatio ex nihilo,' and certainly this doctrine cannot be definitely established from it." (See Driver on Genesis i. 1.) We must be content with the simple idea of Divine activity in some form unknown to us, for as we cannot give a strict definition of "matter," it follows that we must be equally unable to define the mode of its production. Nor can we ignore the spiritual aspect of material things. I quote here a few words written by Professor Fleming (*Evidence of Things Not Seen,* S.P.C.K.): "The insight we have gained into the funda-

mental principles underlying the operation of the material universe, into the nature of matter and the relation of matter and energy, tend more and more to abolish the old dualism between matter and mind or spirit, and to move us in the direction of a spiritual monism which regards both the laws and realities of the external world as the thoughts of an Eternal Mind."

Let us now turn to another point requiring consideration, confining our thoughts to what we —ignorant of its real nature—must still continue to call "the material universe." If Divine creative activity is present in it, what is the nature of the evidence of its presence which can be perceived by us? Only the emergence of physical results, the appearance of something not previously observed. Apart from these new appearances, if we postulate that Divine—and therefore perfect—wisdom directs all the activities of the universe, then all that we can observe is a regularity of sequence which, for the most part at any rate, appears mechanical. The theist and the non-theist are on an equality as far as direct observation of phenomena is concerned. But in our own experience we have the consciousness of a certain power of initiation of events—*e.g.*, of motion. Here again, when such phenomena are due to the actions of persons other than ourselves, we infer from such evidence the presence of motive, will, and purpose. Where we recognize actions apparently directed to an end, the constitution of our minds leads us to infer

INTELLIGENCE and WILL, and therefore PERSONALITY.[1]

Finally the revelations of modern astronomy by which we perceive worlds in a primordial state, stars in such different physical conditions that they can be classified—roughly at least—according to age, lead us to regard Creation as a continuous process.

Aided by science, we are able to peer into the distant past and in some fashion to construct a mental image of the physical condition of our globe in very early ages and its probable appearance hundreds of millions of years ago. As we have seen, "made out of nothing" is an assumption we have no justification for postulating. We have no knowledge of first beginnings, and on this point, beyond the ascription of all that exists to Divine activity, even revelation does not help us. There appears something incongruous in the idea of anything—*e.g.*, a vast cosmos—suddenly springing into existence, set against a background of antecedent and infinite time in which God alone existed. We are obliged to think in terms of "time" and "space" which are present to our consciousness as a necessary framework for our conception of the physical universe. But philosophers and psychologists teach us that to realize the precise

[1] In our observations of nature or of life we perceive only what is *physical,* and thence infer what is *psychical;* interpreting phenomena from the standpoint of our own personality.

significance of the verb TO BE in its twofold relation to time and locality is an extremely difficult task. This lesson is still more strongly impressed on our minds by recent advances in scientific knowledge.

Our common notions of "space" and "time" serve well enough for the ordinary purposes of everyday life and for mundane affairs. Within this limited range there is no reason for us to distrust their reliability. But when our thoughts transcend these narrow limits, and we endeavour to "think cosmically," the vast magnitudes of astronomical velocities and masses compel us to give heed to those refinements of thought and expression which natural philosophers find necessary in the attempt to form an accurate conception of the nature of the universe. For very small deviations from strict agreement with an imperfectly formulated "law of Nature," which are quite inappreciable where only terrestrial masses and motions are concerned, become apparent on the larger scale of celestial mechanics.

The limits of this book, and the incompetence of the writer, forbid anything beyond a very cursory reference being here made to Einstein's Theory of Relativity. In brief, this theory has introduced into Science a new view of the constitution of the physical universe of which the main features are: (*a*) The universe is not geometrically unlimited in extent; (*b*) the concepts of "space" and "time" are inextricably linked together; (*c*) a more philosophical "law of gravitation" is introduced which eliminates the

idea of "action at a distance." This theory cannot now be regarded as a mere imaginative hypothesis, since it accounts for a certain irregularity in the orbital motion of the planet Mercury, which Newton's law of gravitation fails to explain satisfactorily, and it has been further confirmed by the value recently found for the amount of bending which a ray of light undergoes when it passes near the sun. By unifying provinces of thought formerly regarded as distinct, which is the general trend of all scientific progress,[1] the theory marks an advance in natural

[1] In the earlier part of the last century Faraday introduced into Science the consideration of the influence of electrified bodies *on the medium* which separated them, thus laying the foundation of modern electrical science. The subsequent work of Clerk Maxwell, Joule, and many other men of science resulted in uniting electricity, magnetism, light, heat, and other forms of radiant energy under one general principle—wave-motion in ether. Similarly Einstein has introduced the idea of the influence of material bodies upon the properties of "space"—whatever entity that word represents. He has thus made possible a fresh advance in the co-ordination of natural phenomena.

To satisfy public curiosity on this interesting matter several books written in a popular style have recently been published. But no book, of any value, dealing with it is easy to read. (See *An Introduction to the Theory of Relativity*. L. Bolton.) For a sketch of the theory from a scientific and philosophical standpoint Chapter XIV. of *The Domain of Natural Science* may be referred to. (My obligations to Professor Hobson are manifest in nearly every chapter of this book, and in making a final reference to his work I desire to acknowledge my deep indebtedness to the writer. E. H.)

philosophy, though it cannot be asserted that it is the only conceivable hypothesis by which such unification can be effected.

It may be asked why a difficult scientific problem should be introduced into the consideration of a religious question. Surely if we venture to discuss such a topic as the "creation" of the universe this task will be most intelligently performed if we avail ourselves of all knowledge obtained as to its nature. But a more important reason may be assigned. We have seen (Chapter I.) that we cannot erect a rigid barrier between Science and Philosophy on the one hand nor between Philosophy and Theology on the other. The application of a general principle is not restricted to the field of thought in which it is first discovered. Hence an important scientific principle, when once its truth has been established, extends its influence beyond the frontiers of Natural Science. The theory of Evolution originated in the study of Biology, but, regarded as a principle of progressive and correlated development, the conception has been usefully applied to the study of many other branches of knowledge. Similarly the idea of Relativity—not a modern concept but of very ancient origin[1]—which has been brought into great prominence by modern mathematical investigation and recent physical research, is likely to exert a profound

[1] See *The Reign of Relativity,* Chapter III. : "Relativity and what it Means." By Viscount Haldane. (John Murray.)

influence on philosophical and, consequently, on religious thought.

It is with the principle of Relativity in its widest sense that we are here concerned rather than with such concepts as a "space-time continuum," a "fourth dimension," "curvilinear co-ordinates," and the like, necessary as these concepts are to the scientific investigator. The physical Theory of Relativity may be likened to a high ladder of thought, the top of which can only be reached by the accomplished mathematician; but some useful lessons may be learned by those who can only climb the lower rungs. It is very important that the fundamental distinction between "absolute" and "relative" should be clearly apprehended. All ideas of *quantity* involve the idea of *ratio* with reference to a common quality—the comparison of one magnitude with another of a like kind. A first step to the understanding of the Theory of Relativity will have been taken if we realize that we do not know the actual size of any object in the world in which we live. All we can know, and that only approximately, is how many times one object is greater, or smaller, than some other object. To make this clear let us suppose that a man is confined in a room, with blinds drawn and shutters closed, and illuminated by a source of light within it. Now further imagine that, by some magical process, the size of the room and of everything in it, including the man himself, is reduced to half its former dimensions. The occupant would not

perceive, and, in the circumstances supposed, he would have no means of finding out, that any change whatever had taken place, since all the objects remaining unchanged in *relative* size there would be nothing to indicate change to his vision. Replace "room" by "physical universe" and, *mutatis mutandis*, the argument still holds good. We think *relatively*, for we possess no faculty for the discernment of *absolute* values. To put the matter more plainly: if the question were asked, "What is your real height?" then it would be philosophically correct to reply—*I do not know*. Merely to state a relationship between the height of my body and the length of my foot, or of a "standard" foot, would pass muster as a correct "phenomenal" description, but a philosopher would rightly deny that it betokened any knowledge of absolute magnitude. It is only "real" as a *ratio*.

Nor is this attitude of mind restricted only to the estimation of physical values. It affects the whole of our outlook, psychical as well as physical. The idea of relativity lies at the back of such words and phrases as "anthropomorphic"; "our anthropocentric outlook," etc. It is a common saying that "we judge others by ourselves." (Relativity.) Such statements of spiritual truth as: "The pure in heart . . . shall see God," and "He that loveth not knoweth not God," imply that the Divine *within* man recognizes the Divine *without*—for if there is no Divine element in man he possesses no gauge or standard

whereby he can discern the existence of Divinity elsewhere. (Again, Relativity. *Cf.* 1 Cor. ii. 14.)

To learn that there are more things in heaven and earth than are dreamed of in our philosophy is at all times a wholesome experience. These rambling reflections will have served a useful purpose if they enable us better to realize the mystery involved in what we regard as common notions. Perhaps we shall be inclined to a little more reticence when we talk of—and even sometimes venture to criticize—those Divine purposes of which we know so little. The endeavour to grapple with such abstruse problems has its uses. At least, it takes away any tendency to conceit and saves us from that nethermost abyss of ignorance which consists in not knowing that we are ignorant.

Truth, or at least our conception of it, is often necessarily vague, for "we see, as in a mirror, darkly." It is, however, sometimes necessary to contend that a vague idea may possess a higher value than a more definite view, arbitrarily chosen. If we must have a definite statement about every point which arises for consideration, then we must be prepared to admit a large admixture of error.

However far back a scientific retrospect may take us, it cannot include an ultimate origin. "It is as high as heaven; what canst thou do? deeper than hell; what canst thou know?" (Job xi. 8). But, notwithstanding all intellectual difficulties into which we may be led by our consideration

of the word "creation," this fundamental article of our creed amounts to the assertion that *Without God nothing exists*. The value of this confession of faith lies in the recognition of a timeless (*i.e.*, eternal or ever-present) truth rather than in any reference to an act performed at some particular epoch. *Maker* may legitimately include the idea of continuous activity. The world, or universe, is still in process of being made.

The Father Almighty.[1]

Father is the keyword of Christ's teaching as to the nature of God and His relation to humanity. Only by the imagery of human relationships at their best can we form an idea of the Divine nature. Not merely genetic descent, but Care, Protection, Rule, Guidance, Sympathy, and Love are ideas which we associate with the word "father" in the normal human relationship. Under this word we have to include all our ideas of Divine providence in nature and in the ordering of events.

Divine Providence Considered Generally.

Difficulties here force themselves upon the mind which are recognized by all serious thinkers

[1] Not in the sense of being "able to do anything," but "able to do all that He wills to do." God can only act in conformity with His nature.

as insoluble. In particular the problem of evil stands out prominently in its twofold aspect of moral evil and physical suffering. Moral evil is bound up with the question of free will. "If humanity is free, if it once be granted a charter of freedom, it must be free to go wrong as well as to go right" (Sir Oliver Lodge, *The Making of Man,* p. 123). Hence, even in a divinely governed universe, the door to evil is open. What we can infer, and what seems to be a necessary deduction from the idea of God as perfect in wisdom and in goodness, is that evil cannot be a *permanent* characteristic of the universe. It would be a blot upon creation to consider evil as necessary *and* enduring. With regard to the minor problem of physical suffering, if we cannot say that Science has removed the difficulty it has certainly dispelled some popular misconceptions about it, and has diminished the weight of the burden which it imposes on the mind. The cloud has not been dissipated, but the silver lining has been brought into greater prominence and assures us of the undimmed radiance existing behind it. The following quotations are extracts from Sir Ray Lankester's writings (*Great and Small Things:* "Is Nature Cruel?"):

So far are we from knowing the ultimate conditions of existence that we must admit that possibly what we call good cannot exist unless accompanied by what we call evil—that possibly

what we call well-being and happiness is necessarily and inevitably conditioned by pain.[1] . . .

We are led to the conclusion that the supposition that there is an immense amount of unnecessary pain going on in the world is a misinterpretation of the facts. There is "pain," but it is mostly short and sharp and of a directive and protective character. Man has been, and is still being, educated by pain. He has to a large extent gained control of it or learned how to avoid it . . . but there is still in this connection a gigantic task before him. . . .

The main tendency of what I have said leads to the conclusion that pain is not, in the great scheme of the universe, "cruel," but the beneficent guide of the development of sentient beings.

Divine Providence as Illustrated by Evolution.

(*a*) *Inorganic Evolution—The Preparation of the Earth as an Abode for Life.*

Let us now look briefly, for brevity alone is possible, at this question of Divine Providence as exemplified in Nature. More and more impressively is the conviction forced upon us by the teachings of science that natural development is *purposive*. It will be recognized that in this chapter we are passing beyond the domain of pure science, but yet, as a mere statement of

[1] "In the eye of God
Pain may have purpose and be justified."
(Browning.)

fact, the evolution or inorganic development which astronomical and geological science reveals to us has resulted in the making of a terrestrial globe capable of supporting life. Not only so, but the crust of the earth contains, as in our coal and other mineral formations, slowly formed and marvellous stores of energy and material ready for use when life and intelligence were sufficiently developed in man to enable him to obtain and employ them.[1] Can we say that there is no providence or foresight exhibited in such a result, or are we to regard it as purely fortuitous? We have seen also that in the "laws of nature" there are limits to human freedom—*i.e.*, providential guidance taking the form of restriction. Certain consequences are predetermined which man cannot tamper with.

(*b*) *Organic Life upon the Earth, preceding the Appearance of Man.*

How long has the earth been in a condition to support life in its lowest forms? No precise answer can be given to this question, but the period is estimated at not less than 100,000,000 years, and probably longer. (For an abstract of the principal estimates of the age of the earth, with the reasons assigned for them, see *Human Origins,* vol. i., p. 28. By George Grant

[1] In this connection the reader may be referred to the concluding paragraphs of the address of the President of Section C (Geology), delivered at the Toronto meeting of the British Association in 1924.

McCurdy. Appletons. New York.) The story of the development of animal life on the earth is one of the romances as it is also one of the great mysteries of science. What was its purpose? Certainly progress towards greater fullness of life is evident. In the lower forms of animal life very little trace of consciousness, intelligence, and volition is apparent. But as we ascend the scale of animal existence there comes into evidence a marvellous directive power which regulates animal behaviour and which we call instinct. In the past this word has often been used as a cloak for ignorance, but modern biology supplies a definition of it. "Zoologists have come to general agreement as to the meaning of 'instinctive behaviour'—the adjective is safer than the noun. Instinctive behaviour is the expression of hereditarily pre-established linkages between certain nerve-cells and certain muscle-cells." (J. A. Thomson, *Science Old and New*, p. 167.)

Thus instinct is a kind of acquired habit, or organization of structure, capable of transmission, and giving direction to energy, which the animal follows automatically. This activity resembles those "reflex" actions in the human body which are produced when the necessary stimulus has been applied. In this way the lower animals are restricted in behaviour and prevented from going astray on the pathway of life. It is a control in excess of that provided by mechanical "laws of nature." Examined in detail, as in the

conduct of the solitary wasp in making provision for the life of the young wasp which she will never see, it gives an impression of intelligence and foresight which is almost uncanny. We cannot conceive of this procedure as intelligent purposive action recognized as such in the consciousness of the animal. But it seems impossible to resist the conclusion that purpose is thereby displayed. Even if we regard instinct as a slow and unconscious development gradually tending to perfection, must we not also see in it a manifestation of Divine Providence in the direction of animal behaviour? Clearer evidence of the exercise of volition, and a greater psychical development, appears in the behaviour of the higher mammals more nearly related to man.

(c) *Man and his History.*

Every decade makes it more evident that the study of man's nature is incomplete without taking into account the long prehistoric period of human existence. Recent in origin, according to the standards of geological time, yet such existence dates back for a period estimated at not less than half a million years. The story of man's past has been, on the whole, one of advance from lower stages of physical and, more especially, of psychical development. He stands at the head of all terrestrial creation. Moral consciousness emerges and becomes a prominent feature. Possessed of animal instincts, he is also endowed with higher faculties which

he can employ to regulate his conduct and with the still higher capacity for communion with God. Divine providence here takes on a new aspect. Man's material environment is conditioned by "laws of nature." But there is a higher psychical form of control which is less imperative—providential guidance for those *who are willing to be so guided.* Man is not compelled by any mechanical necessity to carry out the Divine will. That will operates universally, and to resist it is to "kick against the pricks," bringing suffering upon the evil-doer and, through his social relationships, upon others also. Much of the evil of the world is thus accounted for. Man's faculties have been continuously developed by the task of subduing nature and by the requirements of social existence. But more than this. He is also capable of reading in the records of Nature the story of his own racial development, and he is susceptible to impressions of its order, beauty, and spiritual suggestiveness.

What does it all mean? What signifies this reign of law and order throughout the farthest depths of space, this intelligible harmony, so that the physical constitution of even the most distant things can be gradually apprehended by the mind of man? What brought all this magnificence into being? What Power guides and controls it? What Intelligence understands it? What can be the attributes of a Being who sees and plans the purpose of it all? Man can but grovel in the dust and murmur forth his own insignificance.

And yet, should he? Does he not, in the recesses of his being, feel some kinship, some beginning of comprehension, some kind of fellow-feeling with an Originator and Designer, an Artist, a Creator; such as man himself is, in however microscopic a degree? For, though so apparently trivial, he knows that he is not really insignificant. He knows that just as nothing is too great, so nothing is too small for attention. He knows that the path of every atom is regulated as exactly as the path of the greatest sun. He is told that the death of a sparrow is not too trivial, and parabolically that the very hairs of his head are all numbered. He knows, too, that he has been given a mind able to apprehend things both small and great. He feels that the power which brought all these things into existence has brought him also; he believes that he has an infinite destiny before him; and he cannot but believe, save in moments of doubt and bewilderment, that the Power which has lavished all that beauty on Creation has thereby demonstrated, not power only but Love.

. . . . .

The Deity is not really isolated from His creatures. He shares with them the pain and the effort, and the hope of ultimate triumph. All religion in some sort testifies to this. And the greatest mystery of the Christian religion is the recognition, as a positive fact, that God is in close relation with humanity, has entered into the strife and turmoil, has taken our nature upon Him, and henceforward now and always is active and energizing and suffering and helping, sorrowing and rejoicing and inspiring, and, in spite of all, loving, and willing to undergo sacrifice for the disappointing creature upon whom He has conferred the privileges

of existence and freedom. (Sir Oliver Lodge, *The Making of Man*, p. 138 *et seq.*)

Here we may fittingly conclude our brief survey. The partial revelation of God in Nature is but the outer court of the higher temple of thought and feeling to the threshold of which we have now come. The aim of this book will have been fulfilled if for the reader any "stones of stumbling" have been removed from the path to its entrance.

A final word. To regard with supercilious indifference those deep convictions and lofty aspirations which have swayed the minds, moved the hearts, and moulded the lives, of wise and good men in all ages of the world's history, is not worthy of a rational human being. "According to Schopenhauer the measure of reverence that one can feel is a measure of one's own intrinsic value. Tell me how much respect you can feel and I will tell you what you are worth." (*Einstein the Searcher*, p. 39.)

BOOKS RECOMMENDED

Belief in God. By Bishop Gore. (John Murray.)

The Knowledge of God and its Historical Development. By H. M. Gwatkin, M.A. (T. and T. Clark.) ("This work will rank with the greatest modern contributions to theological thought."—*London Quarterly Review*.)

The Faith and Modern Thought. By William Temple, Headmaster of Repton School (now Bishop of Manchester). 1912. (Macmillan.)

"Avoid as a sin against the indwelling Logos, or Reason of God, all harsh condemnation of the religious standpoint of others. In proportion to the clearness of your own vision should be your patience with what you consider the irrational doctrines and absurd limitations of another man's religious belief." (Basil Wilberforce, D.D., *Light on the Problems of Life*, p. 152. (Elliot Stock.)

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